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ESSEX NATURALIST:

BEING THE

Journal of the Essex Field Club.

EDITED BY

WILLIAM COLE,

Honorary Secretary.

VOLUME I.

JANUARY—DECEMBER, 1887.

"*Men that undertake only one district, are much more likely to advance natural knowledge, than those that grasp at more than they can possibly be acquainted with. Every kingdom, every province, should have its own Monographer.*"—GILBERT WHITE, of Selborne.

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To reasonable worship; she alone
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To offer them a stone."

—WILLIAM MORRIS.

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36-34
8-6

INDEX TO VOLUME I.

Adder, Voracity of, 150.

Alga, Essex, 166; New British (*Vaucheria*) lately found near Maldon, 151.

Apamea ophiogramma at Brentwood, 206.

Badgers in Essex, 114, 150; formerly at Maldon, 186; near Ilford, 186; near Epping, 183; in Essex Islands, 224.

Balfour, Prof., Life Histories of Plants, 278.

Barometers, Living, 40.

Bats, A Colony of, 93; found in Deneholes, 259.

Beaumont, G. F., Well-section at Kelvedon, 189.

Bees at Field Beans, 159, 207.

Bembidium lunatum in Essex, 205.

Benfleet, *Cleptes nitidula* at, 93.

Bennett, F. J., On Chalk-wells, 260.

Benson (Rev.), T., Notice of, 138; Herbarium of, 205.

Bird Harmonies, 160.

Bitter-cress, Gall on, 178.

Book Notice, The Chapel of St. John at Epping, etc., 17.

Boulders, Some Essex, 117; at Brentwood, 186; at Roxwell, 82.

Boulenger, G. A., Palmated Newt in Epping Forest, 8.

Boulger, Prof. G. S., History of Botany in Essex, 277.

Botany, History of, in Essex, 277.

Bramble, Essex, 206.

Brentwood, *Apamea ophiogramma* at, 206; Boulder at, 186; *Notodonta trepida* near, 113; *Stauropus fagi* near, 176.

British Association, Manchester Meeting of, 197.

British Urns, Early, near Nayland, Suffolk, and Wix, Essex, 35, 106.

Buckhurst Hill, Dormouse at, 63.

Catchpool, E., Curious Capture of an Eel, 196; Stoat's Larder, 187.

Cecidomyia cardaminis, Gall on Bitter-cress, 178.

Celts, Neolithic, at Felstead, 62.

Chalk-wells, 260; in Buckinghamshire, 225, 254.

Chærocampa porcellus in Epping Forest, 113.

Challis, F., Notes on Geology of Chelmsford, 16, 209.

Chelmsford, Gravel Pits and Ancient Pottery near, 92; Notes on Geology of, 16, 209.

Chingford, *Ino statices* at, 218; *Sphinx convolvuli* at, 218.

Chipping Norton, Pits near, 265.

Christy, Miller, Bats in Deneholes, 259.

Christy, R. W., Bees at Field Beans, 159; Boulders and Pits with Roman (?) Deposits near Roxwell, 82: Voracity of Adder, 150; Well-section at Roxwell, 150, 280.

Clarke, Joseph, Notes on Saffron in connection with Town of Saffron Walden, 9.

Cleptes nitidula (Chrysididæ) at Benfleet, 93.

Cooke, Dr. M. C., on Fungus Foray 1888, 221; Preliminary List of the Microscopic Fungi of Essex, 184.

Colchester, Grasshopper Warbler near, 176; Great Snipe near, 189; Report on Flowering Plants of, 22, 116.

Cole, W., and **T. V. Holmes**, Report on Denehole Explorations, 225.

Coleoptera in Northey Island, 209.

Cooper, Sidney, *Ino statices* and *Sphinx convolvuli* at Chingford, 218.

Corder, H., Gravel-pits and Ancient Pottery at Chelmsford, 92.

Council, Members of, for 1888, 279.

Crouch, Walter, Havering and Neighbourhood, 144, 148; Number of Species of Mollusca in Beacontre Hundred, 176; on Tilbury Whale, 279.

Dane-wort, or Dane's-blood, 150.

Deer of Epping Forest, 46.

Deer, Red, Herd of from Single Hind at Hatfield Broad Oak, 189.

Deer-hunt on Railway, 280.

Deneholes at Bexley, 187; Ancient, near Tilbury, 188; and Cesspools, 108; Bats found in, 259; Bones found in, 257; Club's Visit to, 203; Exploration of, 202; Exploration Fund, List of Subscribers to, 255; Elliott on, 223, 254; Fragments of Millstones in, 259; at Frinsbury, Kent, 108: Herald Moth in, 203; Meldola on, 223; Photographs of, 223; Report on Exploration at Hangman's Wood (1884-1887), 223, 225-276.

Dicycla oo at Grays, and in Epping Forest, 205.

Dixon, H. N., *Grimmia commutata* in Essex, 206.

Dormouse at Buckhurst Hill, 63.

Earthquake Shock, Supposed, 277.

Eel, Curious Capture of, 196.

Elliott, F. W., on Pits near Burnham Beeches, 224.

English, J. L., Badgers near Epping, 183; Entomological Notes, 109.

Ensilage, or Preserving Grain in Pits, 266.

Entomological Notes from an Old Pocket Book, 109.

Epping, Badgers near, 183.

Epping Forest, *Chærocampa porcellus* in, 113; Deer of, 46; *Dicycla oo* in, 168; Entomology of, 109; Fires in, 168; Geological Sections at High Beach, 107; Larva of *Harpipteryx scabrella* in, 205; *Lobophora viretata* in, 113; New Fungi to, 219, 220; Palmated Newt in, 8; Ponds in, 206; Tree-frogs in, 159; Woodcock Nesting in, 166.

Erratic Blocks at Orsett and White Notley, 8; at Roxwell, 82.

Essex, Badgers in, 114, 150, 224; Bank-vole in, 196; Boulders in, 117, 186; Bramble, 206; Heronries in, 119, 142; Microscopic Fungi, Preliminary List of, 184; Morden's Map of, 159, 280; Norden's Map of, 41; Plants, 206; Plants observed by Rev. T. Benson, 139; Pre-historic Remains in, Proposed List of, 63; Ravens, A Plea for, 182; Ravens in, 142.

"Essex Emerald" Moth, 110, 204.

Essex Field Club, Ordinary Meetings, 63, 94, 106, 146, 168, 203, 221, 223, 277, 279; Field Meetings—at British Museum, 106; at Havering-atte-Bower, 143; at Sudbury, 148; at Theydon Bois, 167; at Hangman's Wood, 203; Eighth Annual Cryptogamic Meeting, 219; Exploration of Deneholes in Hangman's Wood, 202.

Essex Field Club, "What is the Use of the," 180; "Past and future of the," 63.

Eubolia cervinata at Grays, 205.

Evans (Rev.), W. F., Roman or Romano-British Remains at Felstead, 207.

Felstead, List of Land and Freshwater Mollusca of, 277; Neolithic Celts at, 62; Roman or Romano-British Remains at, 207.

Fisher (Rev.), O., Subsidence at Lexden, near Colchester, in 1862, 39.

Fitch, E. A., Badgers formerly at Maldon, 186; Badgers in Essex, 114, 150, 224; Boulder at Brentwood, 186; *Dicycla oo* and *Eubolia cervinata* at Grays, 205; English and French Partridge and Pheasant Laying in Same Nest, 205; Essex Heronries, 142; Essex Gall-makers, Two New, 177; Fossil *Nautilus* from Maldon, 279; Golden Oriole at Purleigh, 113; Great Pipe-fish at Maldon, 114; Otters in Essex, 105; Osprey at Maldon, 45; *Phorodesma smaragdaria*, 204; Plants from Hangman's Wood, 203; Raven, 142; Reptilia, Notes on, 112; Sheldrake, 196; *Sphinx convolvuli* at Maldon, 188; Urns at Purleigh, 279; Well-boring Specimens from Purleigh, 279; Wild Duck in Essex, 150.

Flakes, Replaced, 83; and "Cores," 86.

FLOWER, PROF. W. H., Address on Structure and Modifications of Wings and Feet of Birds, 107.

"Forest of Essex," book by W. R. Fisher, 207, 277.

Frinsbury, Kent, Denehole at, 108.

Fungi, for Church Decoration, 18; Microscopic Essex, Preliminary List of, 184, 222; New to Epping Forest, 219, 220; Uses of, 190.

Fyfield, *Inula helenium* near, 166.

Gall-makers, Two New Essex, 177.

Geology of Chelmsford, 16, 209.

Gilbert, William, Founder of Science of Electricity, 94.

GOODCHILD, J. G., Mounds near the Estuary of the Thames, 210.

Goose, Barnacle, at Tollesbury, 114.

GOULD, F. C., Bird Harmonies, 106, 160.

Gravel, on Northey Island, near Maldon, 151.

Gravel-pits, between Chigwell and Abridge, 106; near Chelmsford, 92.

Grays, *Dicycla oo* and *Eubolia cervinata* at, 205.

GREATHEED, W., Photographs of Deneholes and Erratic Blocks, 223.

Grimmia commutata in Essex, 206.

GURNEY, J. H. (Junr.), A Plea for the Essex Ravens, 182.

Hangman's Wood, Plants from, 203.

Harpipteryx scabrella, Larva of, in Epping Forest, 205.

HARTING, J. E., Deer of Epping Forest, 46; Land and Freshwater Mollusca, and Methods of Preserving them, 169; Mollusca of Epping Forest, 115; Wild Fowl Decoys in Essex, 63; Woodcock Nesting in Epping Forest, 166.

HARWOOD, W. H., *Silene otites* in Essex, 95.

Hatfield Broad Oak Forest, Herd of Red-deer in, 189.

Havering-atte-Bower, Sketch of History of, 144.

Heronries, Essex, 119, 142.

High Beach, Geological Section at, 107.

HOLMES, E. M., New British Alga lately found at Maldon, 151.

HOLMES, T. V., Bones of Palæolithic Man, 45; Deneholes and Cesspools, 108; Denehole at Frinsbury, 108; Descent of a Denehole at Bexley, 107; Essex Field Club, Past and Future of, 64; Excursion to Sudbury, 148; Geological Section at High Beach, 107, at Maldon, 149; Gravel on Northey Island, 152; Subsidence at Lexden, 1, 40, 95.

HOLMES, T. V., and W. COLE, Report on the Denehole Explorations at Hangman's Wood, 225.

HOUBLON, J. A., Herd of Red-deer from Single Hind in Hatfield Broad Oak Forest, 189.

Hormomyia ptarmicæ, Gall on Sneezewort, 177.

Hypochæris glabra in Essex, 40.

Ilford, *Sphinx convolvuli* at, 205.

Ino statices at Chingford, 218.

Inula crithmoides (Golden Samphire), 62; *I. helenium* near Fyfield, 166.

JANSON, O. E., Coleoptera in Northey Island, 209.

KENWORTHY (REV.), W. J., Block of Conglomerate at White Notley, 8.

Kelvedon, Well-section at, 189.

Larvæ of Lepidoptera, Lord Walsingham's Collection of, 107.

LAVER, H., Early British Urns near Nayland and Wix, 35; Great Snipe near Colchester, 189.

Lea, Valley of the, Primæval Man in, 36, 83, 125.

Lexden, Subsidence at, 1, 39, 95.

Leyton, Stone-mites at, 166.

Lightning Flash, Photographs of, 204.

Lobophora viretata in Epping Forest, 113.

LOCKYER, A., Fungi for Decoration, 18; Living Barometers, 40.

Lopping and Topping, 93.

London Clay, Rudler on, 279.

MACHIN, W., Larva of *Harpipteryx scabrella* in Epping Forest, 205.

MACMURDO, W. G., Tree-frogs in Epping Forest, 159.

Maldon, New British Alga, at, 151; Badgers formerly at, 186; Fossil *Nautilus* at, 279, Great Pipe-fish at, 114; Osprey at, 45; Section at, 149; *Sphinx convolvuli* at, 188.

Meldola, Prof. R., on Explorations of the Deneholes, 223; on Life-histories of Plants, 278; Manchester Meeting of the British Association, 197; Modes of Concealment of Mollusca, 175.

Melilotus arvensis at Walthamstow, 45.

Mersea, Red-hills in, 115, 181.

Mollusca, of Epping Forest, Proposed List of, 115, 169, 176; of Felstead, 277; Fossil, found in Palæolithic Sands, List of, 135; Land and Fresh-water, and Methods of Preserving them, 169; Modes of Concealment of, 175; Number of Species in Beacontre Hundred, 176; Works on, 174.

Mounds near Estuary of the Thames, 210.

Mounds, Salting, of Essex, 96, 115, 181.

Morden's Map of Essex, 159, 280.

Morris, B., Affection of Rabbit for her Young, 187.

Nayland (Suffolk), Early British Urns near, 35, 106.

Neolithic Celts at Felstead, 62.

Newt, Palmated (*Molge palmata*), in Epping Forest, 8.

Newton, E. T., Notes on Bones found in Deneholes, 257.

Niedermendig Millstone in Denehole, 259; at Roxwell, 82.

Norden's Map of Essex, 41.

Northey Island, Coleoptera in, 209; Gravel at, 151.

Notodonta trepida near Brentwood, 113.

Obituary.—Rev. T. Benson, Colonel Russell, E. G. Varenne, 138—142.

Officers of Club for 1888, 279.

Oldham, C., *Chærocampa porcellus* in Epping Forest, 113; *Dicyla oo* in Epping Forest, 168.

Ongar, Large Trout in Cripsey Brook, 149.

Oriole, Golden, at Purleigh, 113.

Orsett, Sandstone Block at, 8.

Osprey at Maldon, Supposed occurrence of, 45.

Otters in Essex, 105; in Stour and Pods Brook, 280; at Wakes Colne, 91.

Palæolithic Man, Bones of, 45; in the Valley of the Lea, 36, 83, 125; Supposed Skull of, from Bury St. Edmunds, 136.

Palæolithic Implements, 125; Manufacture of, 87; Sands, List of Animals and Shells found in, 135, 136.

Partridges Alighting on Water, 205; English and French, and Pheasant, Laying in same Nest, 205.

Paulson, R., *Inula helenium* near Fyfield, 166.

Phorodesma smaragdaria in Essex, 110, 204.

Pictsbury Ramparts, 79, 82.

Pipe-fish, Great, at Maldon, 114.

Pits near Burnham Beeches, 224, 254; at Chipping Norton, 265; Preserving Grain in, 266; with Roman (?) Deposits, near Roxwell, 82.

Plants, Essex, 206; Flowering, of Colchester, 22, 116; Life-histories of, 278.

Pottery, Ancient, near Chelmsford, 92.

Powell, J. T., Essex Plants, 206; Essex Bramble, 206; *Melilotus arvensis* at Walthamstow, 45.

Pre-historic Man, Food of, 92.

Primæval Man in the Valley of the Lea, 36, 83, 125.

Purleigh, Cinerary Urns at, 279; Golden Oriole at, 113; Well at, 279.

Rabbit, Affection of, for her Young, 187.

Railway, Deer Hunt on, 280.

Ramsden, H., *Lobophora viretata* in Epping Forest, 113.

Ravens, in Essex, 142; Plea for the Essex, 182.

Raynor (Rev.), G. A., *Apamea ophiogramma* at Brentwood, 206.

Red-hills in Mersea, 115, 181.

Reptilia, Notes on, 112.

Roman or Romano-British Remains at Felstead, 207.

Rowe (Rev.), A. W., Neolithic Celts at Felstead, 62; Some Essex Boulders, 117.

Roxwell, Boulders and Pits at, 82; Well-section at, 150, 280.

Rudler, F. W., on London Clay, 279; on Fragment of Millstone from a Denehole, 259.

Russell, Colonel, Notice of, 139.

Saffron Plant, Notes on, and in connection with the Town of Saffron Walden, 9.

Salting Mounds of Essex, 96, 115, 181.

Samphire, Golden, 62.

Section at High Beach, 107; at Maldon, 149.

Sheldrake (*Tadorna cornuta*), 196.

Shenstone, J. C., *Inula crithmoides*, 62; Photographs of British Urns, 106; Report on Flowering Plants of Colchester, 22, 116; on Salting Mounds, 181.

Silene otites in Essex, 62, 95.

Smith, Worthington G., Primæval Man in the Valley of the Lea, 36, 83, 125; Sandstone and Conglomerate Blocks at Orsett and White Notley, 8.

Sneeze-wort (*Achillea*), Gall on, 177.

Snipe, Great, near Colchester, 189.

Sparganium neglectum in Essex, 40.

Spalding, F., Barnacle Goose at Tollesbury, 114; Grasshopper Warbler near Colchester, 176.

Sphinx convolvuli at Chingford, 218; at Ilford, 205; at Maldon, 188.

Spurrell, F. C. J., Ensilage, or Preserving Grain in Pits, 266; Withambury, 19.

Stauropus fagi near Brentwood, 176.

Stoat's Larder, A, 187.

Stone-mites (*Petrobia*), 166.

Stopes, H., The Salting Mounds of Essex, 96.

Stour, Otters in the, 280.

Subsidence at Lexden (1862), 1, 39, 95.

Sudbury, Excursion to, 148.

Swifts, Late Stay of, 264.

Thames, Estuary of, Mounds near, 210.

"There were Giants in those Days," 124.

Theydon Bois: Enquiry into the Origin of the Word "Bois," 153.

Thompson, Prof. S. P., on William Gilbert, 94.

Tilbury, Whale at, 205, 279.

Tollesbury, Barnacle Goose at, 114.

Tonge, A. E., *Sphinx convolvuli* at Ilford, 205.

Tree-frogs in Epping Forest, 159.

Trout in Cripsey Brook, Ongar, 149.

Urns, Cinerary, at Purleigh, 279.

Varenne, E. G., Death of, 142.

Varley, F. H., on William Gilbert, 94.

Vice-Presidents for 1887, 63.

Vole, Bank, in Essex, 196.

Wakes Colne, Otters at, 91.

Walden, Saffron, in connection with the Saffron Plant, 9.

Walker, H., Exhibits Photographs of Lightning Flash, 204.

Walsingham's, Lord, Collection of Larvæ of Lepidoptera, 107.

Walthamstow, *Melilotus arvensis* at, 45.

Warbler, Grasshopper, near Colchester, 176.

Well-section at Kelvedon, 189; at Roxwell, 150, 280.

Whale at Tilbury, 205, 279.

Wharton, H. T., The Uses of Fungi, 190.

Whitaker, W., "What is the use of the Essex Field Club?" 180.

White, W., Herald Moth in Denehole, 203.

White Notley, Block of Conglomerate at, 8.

Wild Duck in Essex, 150.

Williment, R. G., *Notodonta trepida* near Brentwood, 113; *Stauropus fagi* near Brentwood.

Winstone, B., "Ancient Chapel of St. John, in the town of Epping" (notice of), 17; Theydon Bois: An Enquiry into the Origin of the Word "Bois," 153.

Wire, A. P., Epping Forest Ponds, 206; Essex Alga, 166; Stone-mites, 166.

Withambury, 19.
Wix, Early British Urns at, 35, 106.
Woodcock Nesting in Epping Forest, 166.
WOODWARD, H. B., Pits at Chipping Norton, 265.
Wormingford, Destruction of a Mound at, 82.

PLATES.

I. Map of Essex, by John Norden, 1594.
II. Map of Essex, by Robert Morden, 1695.
III. Map of Hangman's Wood, showing the position of the principal Deneholes.
IV. Ground-plan of Deneholes, visited or explored by the Essex Field Club.
V. Geological Sketch-map of the neighbourhood of Hangman's Wood, and Bexley.

[*It is recommended that the two maps* (*Plates I. and II.*) *should be mounted on linen, and preserved in pockets formed in the covers of the volume.*]

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Page 119, *note*, for "*Heronies*," *read Heronries*,
,, 120, lines 2 and 13, for "*Phorosdesma*," *read Phorodesma.*

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The Essex Naturalist:

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OF THE

ESSEX FIELD CLUB.

EDITED BY

WILLIAM COLE,

Honorary Secretary.

Contents:

	PAGE
On the Subsidence at Lexden, near Colchester, in 1862.—By T. V. HOLMES, F.G.S., M.A.I. (*With five illustrations*)	1
Notes.—Sandstone and Conglomerate Blocks at Orsett and White Notley—*W. G. Smith, F.L.S.*; Block of Conglomerate at White Notley—*Rev. J. W. Kenworthy*; Palmated Newt (*Molge palmata*) in Epping Forest	8
Notes on the Saffron Plant (*Crocus Sativus L.*), **and in connection with the name of the town of Saffron Walden**—By JOSEPH CLARKE, F.S.A.	9
Note.—On the Geology of Chelmsford and Neighbourhood—*F. Challis*	16
The Library Table	17
Note.—Fungi for Church Decoration—*A. Lockyer*	18
Withambury.—By F. C. J. SPURRELL, F.G.S. (*With plan*)	19
Report on the Flowering Plants Growing in the Neighbourhood of Colchester—By J. C. SHENSTONE, F.R.M.S. (*Commencement*)	22

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THE ESSEX NATURALIST,

BEING

THE JOURNAL [“*TRANSACTIONS*” *AND* “*PROCEEDINGS*”] OF THE ESSEX FIELD CLUB.

Published not LATER *than the 20th of each month.*

THE Council has resolved in future to issue the “Transactions” and “Proceedings” of the Club combined in the form of a monthly periodical under the above title. The journal will normally consist of 16 pages per month, but in all probability frequent “double numbers” will be issued, in order to keep pace with the rapid accumulation of papers which have been read before the Club. The ESSEX NATURALIST will be sent, post free, *to all members who are not in arrear with their subscriptions*, and will be on sale to non-members at a price not exceeding 6d. per sheet of 16 pages.

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THE

ESSEX NATURALIST:

BEING

Journal of the Essex Field Club

FOR 1887.

ON THE SUBSIDENCE AT LEXDEN, NEAR COLCHESTER, IN 1862.[1]

BY T. V. HOLMES, F.G.S., M.A.I.,

(*Read May 24th*, 1884.)

HAVING accompanied Messrs. Meldola and Cole on their visit to Colchester, to witness the effects of the earthquake, I resolved, before leaving that neighbourhood, to endeavour to ascertain the exact position of the Lexden Subsidence, with a view of marking it on the six inch Ordnance map, if nothing more. Accordingly, Mr. Cole and I went to Lexden on the morning of Monday, May 5th, 1884, and fortunately found a labourer who remembered the occurrence of the sinking twenty-two years ago, and who conducted us to the exact spot. The hole has long since been filled up, and it would have been impossible to have found out its position without his help. This Lexden subsidence formed the subject of a paper by the Rev. Osmond Fisher, F.G.S., and of a letter from Mr. F. Rutley, F.G.S., both of which appeared in the "Geological Magazine" for 1865, pp. 101 and 231. As Mr. Fisher and Mr. Rutley arrived at totally opposite conclusions with regard to the cause of this strange sinking, and as I am myself in favour of a third and wholly distinct explanation, I will first of all give a brief account of the views of the two geologists I have named, and then state my own.

Mr. Fisher remarks that he did not hear of this subsidence till 1864. It took place suddenly, some workmen, who were in the field in the morning, finding it there on their return from dinner. The cavity produced was elliptical in form, about twenty feet in depth, and seventy-five feet in circumference. The sides were clean cut in the gravel, which is stratified, and had evidently never been disturbed. The ground in which the pit appeared consists of a slightly rising bank of valley-gravel, the sub-soil being London clay, and is about fifty yards south of the River Colne. (Mr. Fisher's section is the wrong side up on page 101, "Geological Magazine" this is corrected on the page opposite 192.[2] (Fig. 1.)

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[1] The date given in the "Geological Magazine" is 1861, but this, as will shortly be shown, is a mistake. It is worth noting specially, lest the local historian of the future should be in doubt whether two sinkings occurred or only one.

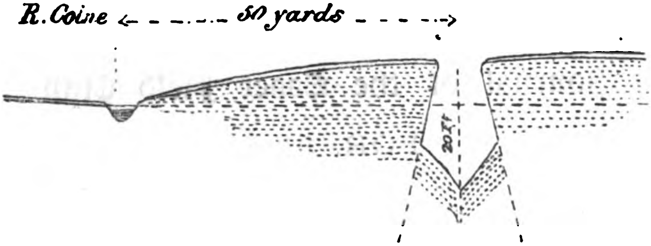

FIG. 1.—Diagram-Section of the Subsidence at Lexden (Rev. Osmond Fisher), from "Geological Magazine," 1865.

Mr. F. Rutley states that he saw the subsidence in 1862, and examined it carefully. The drawing he gives of it (fig. 2), differs somewhat from Mr. Fisher's, as might be expected, when it is remembered that Mr. Rutley's visit was much the earlier one. Both writers agree, however, as to the undisturbed look of the gravel, and as to appearances generally. We may now turn to their explanations of this singular occurrence.

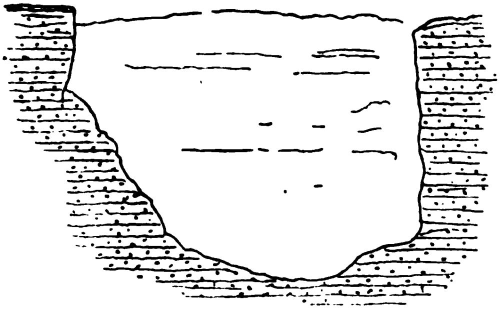

FIG. 2.—Section of Pit (Mr. F. Rutley), from "Geological Magazine," 1865.

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[2] We are indebted to our member, Mr. W. J. Argent, for preparing these drawings for the photo-etching process.—ED.

Mr. Fisher considers that there must be a vacuity somewhere beneath the subsidence. It cannot, he says, be in the gravel, as its stratification is perfectly regular; it cannot be in the London clay, but such a cavity may probably exist in the chalk. When the well was bored at Colchester Water Works, the tool, after passing through a layer of flints, sank suddenly, and the water rushed up with great force. "This shows," says Mr. Fisher, "that the spring is connected with an extensive and free reservoir. There are two other wells, at distances of a mile and a mile and a-half, in a straight line east of this one, which are evidently connected with the same reservoir; for on Mondays, when the pumps are not at work at the water works, the water stands higher than usual in those wells." Mr. Fisher's conclusion, therefore, is "that the motion of the water in this subterranean reservoir, caused by the draught of water at the wells, disturbed the equilibrium of the roofing of the chasm at a point where it was barely stable, and caused the subsidence in question."

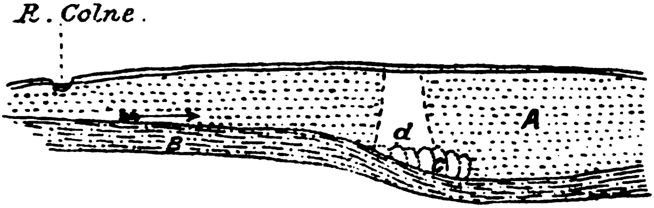

FIG. 3.—The Lexden Subsidence (Mr. F. Rutley), "Geological Magazine," 1865. A, Gravel; B, London Clay; C, Dotted lines to show successive stages of erosion; D, Point at which the debris would stand highest.

The depth at which the abundant supply of water was obtained at Colchester Water Works is given by Mr. Fisher as 294 feet. He also points out that the chalk appears to be lying nearly horizontal in the neighbourhood of Colchester. Mr. Rutley's comment on Mr. Fisher's explanation is: "If the cavity at this depth were large, why did not a larger area subside?—and if small, surely it would not cause a roof of from 200 feet to 300 feet to sink." His own view is, "that erosion has taken place in the low-level gravel at a small depth below the pit, say twenty feet or a little more (allowing an inequality in the thickness of the bed of gravel, which at the well a mile distant, was found to be about twelve feet), and that when this erosive action had sufficiently undermined, the roof fell in. The erosion would have been either from water from the river Colne, or from rain having percolated the gravel, and run down an inclined surface of the clay at its junction with the gravel." He adds a diagram to illustrate his view. (Fig 3)

While I think that Mr. Rutley's remarks on the chalk cavity are decisive against that explanation—apart from other reasons against it—I cannot but consider Mr. Fisher right in rejecting, among other things, the notion of a cavity in the gravel. For it is extremely difficult to understand in what way a cavity—especially one of any size—could come into existence in this gravel. Of course, where there is a broken drain, or an old cesspool, into which gravel may be washed by rain, a large quantity of material may find its way into them in time. And if, at the same time, the upper beds of the gravel are very much harder and more coherent than the lower ones, a subterranean cavity may gradually be formed, and suddenly reveal itself.[3] But we have no reason in this case to suspect the presence of any artificial workings, and, apart from them, I do not see how a cavity could originate, for directly below the gravel, we have, not chalk, but London clay, for one hundred feet or more, and no cavity could be formed (as Mr. Fisher remarks) in the clay. Finally, even if we grant the abstract possibility of a cavity in the gravel, it is extremely unlikely that the gravel, in this case, is thick enough to allow of the formation of a subterranean cavity in it of the size implied by that of the sinking at the surface.

We may now consider the possibility of the existence of a denehole as the cause of this sudden subsidence; deneholes being known to have a way of disclosing themselves in this somewhat startling fashion. The section at the Lexden sinking is probably almost identical with that at Colchester Water Works, which is thus given by Mr. Fisher :—

WELL AT COLCHESTER WATER WORKS.

	ft.
Soil and low-level gravel	12
London Clay	105
Woolwich and Reading Beds	25
Chalk, bored	152
Plenty of good water at	294 ft.

Other Colchester wells, being sunk in higher ground, show a greater thickness of beds lying above the chalk. It is evident, therefore, that the chalk would hardly be reached at Lexden at a depth less than

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[3] A cavity was thus formed at the back of my own house lately. It stands on Thames Valley gravel. On having some paving-stones taken up last February, in order that their surface might be made even, it was discovered that below them was a hollow, about six feet by two feet, and two feet six inches deep. The gravel removed had been washed down into an old cesspool that had not been filled up, the existence of which was unsuspected when these same paving-stones were taken up four or five years ago. The cesspool was a few feet away from the cavity, and the paving-stones had acted just as a hard upper band in the gravel might have done.

145 feet to 150 feet. For, as Mr. Fisher remarks, the chalk is lying nearly flat in the neighbourhood of Colchester. But the depth at which the chalk lies offers by no means the most conclusive presumption against the existence of a denehole there. This is rather to be found in the fact that nowhere does the chalk crop out at the surface nearer than Sudbury and Hadleigh, both on the north; in other quarters it does not appear at all, at similar distances from Lexden. Besides, the beds overlying the chalk in this district are both numerous and variable, and those belonging to the Glacial Drift lie unconformably on the Eocenes and Pliocenes below. Thus, the depth of the chalk beneath the surface, the fact that its nearest outcrop is about twelve miles away, and in one quarter only, and the variability and unconformities among the overlying beds, all combine to show the extreme improbability that any deneholes exist in the neighbourhood of Lexden.

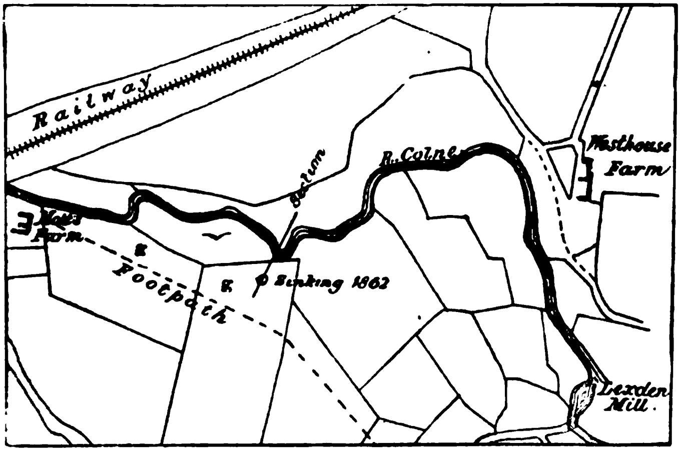

Fig 4.—From 6-in. Ordnance Map. ⋎ Alluvium. g Gravel.

A glance at the six-inch map (Fig. 4) seems to me to suggest a much more probable explanation of this Lexden cavity than any of the three already mentioned. My own opinion is that it was the result, not of a vertical subsidence, but of a simple landslip. The river, where it most nearly approaches the site of the cavity, makes a sharp bend, the current tending to eat into the southern bank, near which the sinking occurred. Landslips must often have occurred at this point; but so long as they were small, and only a few feet of ground close to the stream was affected by them, they would excite little interest or attention. (Fig. 5). This landslip explanation would certainly not be likely to occur to anyone looking at the sections of Messrs. Fisher and Rutley, who both make the bottom of the cavity much lower than the bed of the river. But, in the first place, their sections appear to have been drawn from memory, and memory, as regards the depth of an irregularly-shaped hole, into which no descent was made, is extremely likely to deceive, as I have myself experienced. It would seem, too, that the distance of the cavity from the river tended to put both these able geologists on the wrong scent, and prevented them from giving any real consideration to the question of the comparative depth of the subsidence and the river-bed, or to any explanation except one involving a vertical subsidence, the result of a subterranean cavity. Now, there is satisfactory evidence for lessening the depth of the sinking. Mr. Fisher speaks of it as "about twenty feet." But the labourer who guided us to the spot, and saw it directly it displayed itself, spoke of it as from fifteen to sixteen feet in depth. Mr. A. P. Wire, an esteemed member of the Essex Field Club (then residing at Colchester), has kindly sent me the following extract from his diary bearing on the Lexden sinking, which he visited a day or two after it occurred[4]:—

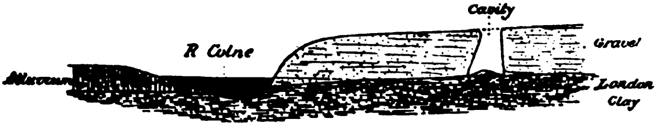

Fig. 5.—Diagram-Section from Cavity to River-bend (T. V. Holmes).

> "Saturday, May 3rd, 1862.—To-day I went to see a hole caused by a landslip at Lexden. The hole is in a field near the Viaduct. It is nearly circular, about ten feet deep and sixteen feet in diameter. The surface stratum is shown. It is gravel. I suppose it was caused by subterranean springs washing away the earth underneath where the hole was."

On receiving the extract from Mr. Wire's diary, I noticed that the date given was a year later than Mr. Fisher's. I then wrote to Mr. Gurney Benham, Editor of the "Essex Standard," Colchester, and he was good enough to ascertain, by reference to the files of his newspaper, that a paragraph on the subject had appeared in that journal a day or two after the occurrence. Below is this paragraph; it was reprinted in the "Essex Standard" of May 31, 1884:—

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[4] The evidence of Mr. Wire and of the "Essex Standard," was not known to me when I read my paper on this subject on the 24th of May, though my conclusions then were precisely those here given.—T. V. H.

> "Landslip at Lexden.—A landslip of a very unusual character in this part of the country has just occurred at the Malting Farm, Lexden, in the occupation of Mr Edmund S. Phillips, and only a short distance from the well-known Lexden Springs. In the course of Wednesday week, a portion of ground in a clover field appears to have sunk perpendicularly, leaving an opening (which was discovered next day) of an oval shape, about twenty-one feet by sixteen, and eleven feet in depth, including about two feet of water at the bottom. The spot is about forty yards from the river, and as the whole neighbourhood abounds in springs, it is supposed the water, acting upon a vein of what is known as blowing sand, had forced an outlet into the river, and so produced a cavity which led to the slip above described. But how it should have occurred at that particular spot it is difficult to account for, as the upper stratum is of considerable thickness, and there has been neither heavy rains to cause a settlement, nor the passage of traffic to produce a jar or dismemberment, there having been no carting over, or cultivation of, the field since last harvest."—"Essex Standard," Friday, May 2, 1862.

It will be noticed that its writer very nearly agrees with Mr. Wire in his estimate of the depth of the sinking, and also that he speaks of "about two feet of water at the bottom," though there had been no heavy rains.

I revisited the scene on the 4th of August, 1884, when the river was low in consequence of the long-continued drought. A ditch, draining the gravel, has its outfall into the Colne at the bend nearest the sinking, its course being along the hedge ranging from the bend westward. From this ditch a swift current of water was flowing into the almost stagnant Colne, its volume being somewhat remarkable when the dryness of the season was considered, and showing how large a proportion of the water collecting towards the base of the gravel must find its way into the river at this point. With a measuring tape I ascertained that the level of the surface of the river was then about nine feet below that of the ground at the site of the subsidence, while the deepest point in the bed of the stream may have been about three feet lower still. Now, estimating the bottom of the river-bed at the bend to be from twelve to thirteen feet lower than the surface of the ground at the sinking, and the depth of the sinking itself to have been about ten feet, an ordinary landslip becomes the most simple and obvious explanation of the formation of the cavity. The gravel, nine or ten feet thick, resting upon impermeable clay, would be full of water towards its base, and a very gentle dip towards the river bend would tend to cause it to slip forward in that direction, the peculiarity in this case being that a very much larger area of ground than usual was affected, the result becoming obvious at an unusual distance from the stream. Of course, all signs of cracks in the soft gravel between the cavity and the river—never conspicuous—must have been totally obliterated long before the visits of Messrs. Rutley and Fisher, while the river current would quickly remove any loose material projected into it at the bend. In conclusion, I venture to claim for this explanation of the Lexden sinking freedom from the very grave difficulties attending any vertical subsidence hypothesis, whether implying the existence of natural cavities or of deneholes.

Sandstone and Conglomerate Blocks at Orsett and White Notley.—Whilst returning hurriedly from Stanford-le-Hope to Grays one evening a few weeks ago, I noticed on the west side of Orsett Heath an enormous block of indurated sandstone. Is this block known to geologists? I never saw it before. It is in a disused gravel pit, and the gravel appears to have been excavated away from the stone, and the block left *in situ* near the hedge. The light was fading, and I had no time to examine or measure the stone, but I should say it is five feet long and two or three feet wide and deep—the largest sandstone block I have heard of as occurring in the gravels near London. It belongs to the top stratum of gravel, and it must, I should say, have been dropped from a mass of floating ice. I could not see whether the block was striated or not. A friend has told me of a very large block of Hertfordshire conglomerate on the roadside opposite a blacksmith's shop at White Notley, near Witham. Is this block known? It was described as being of unusually large size.—WORTHINGTON G. SMITH, F.L.S., May, 1884.

Block of Conglomerate at White Notley.—This stands on the right-hand side of the road leading from White Notley to Bulford, against a blacksmith's shop, about half a mile from White Notley village. It is the only large conglomerate erratic block that I know of about this neighbourhood. Small lumps are plentiful in the gravel pits. In Chesham Churchyard, Bucks, there are several of the same kind, and one is ten or twelve feet across. These are seated on a sharp hill, and appear to be *in situ*. At a place called Denner Hill, two miles south-west of Hampden, Bucks, there are masses of conglomerate and rough reddish sandstone (small blocks of which abound here) weighing a hundred tons or more. The material and character of the mass appear to be the same as in those found in Essex. I have seen the two large blocks named above, but have hitherto found no published account of them.—(REV.) J. W. KENWORTHY, Braintree, August, 1885.

Palmated Newt (Molge palmata) in Epping Forest.—In the "Zoologist" for June, 1886 (3rd Ser., vol. x., p. 250), Mr. G. A. Boulenger, F.Z.S., records the occurrence of this newt in a small pit near Chingford Station. It was quite abundant, in company with *M. cristata* and *M. vulgaris*. We gather from previous papers by Mr. Boulenger that this local species is distributed as follows:—*Scotland*.—Sutherland, Edinburgh, Kircudbrightshire. *England*.—Lancashire, Herefordshire, Gloucestershire, Cornwall, Devonshire, Somersetshire, Dorsetshire, Isle of Wight, and now Essex must be added to the list of counties in which it occurs. Mr. Boulenger points out ("Zoologist," vol. ix., p. 267), that in addition to the well-known peculiarities which "distinguish the Palmated Newt from the common species, but which apply to the males only, may be added the total absence in the former of pigment on the throat, this region being of a transparent flesh-colour, a character which affords an excellent criterion for the distinction of the two allied species in either sex."—ED.

NOTES ON THE SAFFRON PLANT *(CROCUS SATIVUS, L.)*, AND IN CONNECTION WITH THE NAME OF THE TOWN OF SAFFRON WALDEN.[1]

BY JOSEPH CLARKE, F.S.A.

"The rosy morn in saffron drest."

Taking into consideration the short space of time that, during a day's excursion, can be allotted to the reading of papers, it would be a work of supererogation to inflict an elaborate botanical description of the plant saffron, which may be obtained from any herbal. It was successfully cultivated in the neighbourhood of Walden for somewhat over two centuries, but has disappeared for nearly half that period, and though it has no pretension to be called indigenous, it finds a place in every British flora and treatise on Medical Botany, and even in the Pharmacopœia, so unwilling are we to give up so interesting a plant and so charming a flower. The time of its introduction into this country is not precisely known. As with many other things, from a glimmering through the mist of ages past, it is believed that the Romans brought it with them.[2] The earliest accounts make mention of it growing near a Roman road, running through Essex. This might be Saffron Walden. As the modes of cultivation have gone completely out of the memory of living man, a brief description may not be uninteresting to even the most scientific of the pilgrims of the gatherings of to-day. That the flower and its accredited virtues had great attraction for the ancients is certain. It is conjectured to be the *Nepenthe* of Homer, and the Greek name is *Krokos*, signifying a thread, from the thread-like appearance of the pistils, when dried for use. The name in Hebrew is *Chorukim*. Loudon derives the word from Chaldee, *Krokiœ*. The common name of the plant, with slight modifications, in English, German, French, Dutch, and Spanish, is the same as the Arabic *Zahafran*, which, with the Z softened into S, and pronounced quickly, would be exactly similar to our word.[3] That the plant was held in high repute at an early date by the people of the East, is to be learned from the "Song of Solomon" (iv. c. 14 v.)—"Thy plants are an orchard of pomegranates with pleasant fruits, camphor with spikenard and saffron." The bulb, or "corm," is about the size of a nutmeg, compressed at the bottom; the young leaves and flower are contained in a thin sheath, from which they emerge simultaneously. The flower, though not quite so robust, is similar in shape to the well known spring crocus, *(Crocus verna, L.)*, but is of a lilac or light violet colour, in the centre of which, about half the length of the petal, is a slightly formed style supporting three stigmas of slender shape and orange golden yellow colour. Part of this style or "string," with the stigmas or "chives," is the saffron of commerce. The foliage of the plant, like that of all the crocus tribe, increases in length long after its bloom has faded, and may be readily known by its extreme attenuation. With the exception of some of the finer grasses, the leaves of the crocus are more slender in comparison to their length than those of any other British plant.

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[1] This paper was kindly written specially for the Meeting of the Club at Saffron Walden, on April 14th, 1884, by the venerable author, who is so well known as a local archæologist and naturalist. We are indebted to Prof. Boulger for several notes and memoranda used in passing this paper through the Press.—Ed.

[2] Cole, "Adam in Eden," 1657.

[3] "Crocus is named in greeke Crokos, in englishe saffron or safforne, in dutche saffran, in frenche safrone, it is hote in the second degree and dry in the fyrst." Turner, "Names of Herbes" (1548).

Dr. Douglass, between the years 1723 and 1728, employed proper persons to make observations on the culture of saffron, then growing on a large tract of ground extending from Saffron Walden towards Cambridge. The land accredited to be most conducive to its production was a temperate dry clay, not too stiff, on a substratum of chalk. Early in April the ground was ploughed more deeply than for corn; in May twenty, thirty, and even forty loads of short rotten manure on an acre were ploughed in, and at Midsummer the land was ploughed a third time. The roots were planted in July in rows six inches apart, and three inches from each other. Only the round roots or "corms" were planted; the flat and spiked roots being rejected; and about 128 bushels per acre was the allowance of "seed." In September the ground was well hoed, and the weeds destroyed. At the latter end of September, early in the morning, Sundays not excepted, the flowers were gathered, when the "chives," that is, the style and stigmas, were retained, and the rest of flower discarded. These parts of the flower were dried upon a kiln, covered with a wire netting or a hair cloth, over which were laid several sheets of paper, and weighted. This process required great care and watchfulness. After an hour the coverings were taken off, the saffron turned upside down, and then covered and weighted as before for another hour. If this operation was successful, there was nothing more to do, but simply to turn the cake over a gentle fire every half hour for twenty-four hours. Inferior chives were sprinkled with small beer to make them sweat. About five pounds of wet saffron made about one pound when dried, but in the latter part of the season six pounds were needed. The average portion of dried saffron obtained from an acre the first year was rarely over two pounds, twelve for the second year, and rather more for the third. After this third crop, the midsummer following, the roots were taken up and transplanted to new ground.[3]

Dr. Douglass's estimate for an acre under crocus cultivation in 1728, was:—

	£	s.	d.
Rent for three years	3	0	0
Ploughing three times	0	18	0
Dunging	3	12	0
Hedging	1	16	0
Splitting and Setting the Heads	1	12	0
Weeding and Paring the Ground	1	4	0
Gathering and Picking the Flowers	6	10	0
Drying the Flowers	1	6	0
Instruments of Labour for three years	0	10	0
Ploughing once, Harrowing twice	0	12	0
Gathering the Roots	1	0	0
Raising or Cleaning Roots	1	12	0
Total Charge ...	£23	12	0

It has been stated that saffron was introduced into England directly from Asia.[4] Hackluyt (1582) says that the first root was brought here in the reign of Edward III., by a pilgrim from Tripoli, who concealed it in his staff; had it been discovered, he would have been liable to the penalty of death. This story may be mythical, but Edward III. was renowned for his encouragement of industry of all kinds. To Sir Thomas Smith, a native of Walden, Secretary of State to Edward VI., is attributed the introduction of it to the town of Walden, but though it was grown to a large extent, and its cultivation certainly facilitated by him, he could scarcely have been the means of originating the industry, as the Charity Commissions' report speaks of two saffron gardens belonging to Gepy Simmonds, in 1481, and in the Churchwardens' accounts for Walden, 2nd. Richard III., is this entry:—"Itm. Payd to John Rede for pyking of V unc safron xii^{d}."—and Flemming, a clergyman who resided in the neighbourhood, relates that in 1584 it was extensively grown here; and that in 1565 its abundance was so great that the pickers were offered half the produce for their labour. In many of the wills of the time mention is made of saffron gardens, from half an acre to three acres in extent. This is attested by quotations from the ancient records of the town, 1st Henry VIII., "Q^{d} diversi tenentos huj^{s} manerii trent porcos suos in gardinis croc^{d}." 10th Henry VIII. "It^{m}. 9^{d}. Johes Geyner & Robertus Rosale, trent porcos suos, vagantes ad largū in gardinis crocor'teñ & in blade & graine." Hackluyt in 1582 alludes to Walden as the principal seat of the saffron culture, and Camden[5] and Gerard[6] describe it as being in the highest perfection at the period of their writings. From the former writer they copy what is certainly to be received with reservation, that barley will grow after saffron for eighteen years in succession without any additional manure, and that saffron will grow after it again. A skilful farmer understands the rotation of crops, and what plants will follow each to advantage; and a practical agriculturalist, here on the spot alluded to, says that four crops of barley may follow each other, but not without extra manure. Hackluyt, Camden, Gerard, and Ray all mention Walden as the chief place of saffron cultivation, from whence it gradually extended in nearly a northern direction through the villages of Cambridgeshire to Cambridge. In 1531 the town accounts of Cambridge show that saffron was grown in Cambridge and Barnwell to a great extent. In Barnwell-field there were twelve acres; the prior of Barnwell had ten acres; and in Cambridge fields there were eight acres and three roods planted. At this time the price varied from sixty shillings to twenty shillings according to good or bad seasons. In John Norden's account of Essex, 1594, is written "About the town of Walden groweth great store of saffron, whose nature, in yelding her fruite, is verie straunge, and bindeth the laborer to greate trauaile and dilligence; and yet at length yealdeth no small advantage to recomforte him agayne."

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[3] See "Philosophical Transactions," Nos. 138, 380, 404.—Ed.

[4] It was cultivated by the Arabs in Spain about A.D. 960, and is mentioned in English Leechbooks of the 10th century. See Ellacombe's "Plant-lore of Shakespeare."—Ed.

Camden says, "The fieldes here (Walden) on every side smell sweetly, and smile pleasantly with saffron." About half a century ago, in trenching the triangular piece of ground, now the lawn on the western side of the Museum, a small plant of saffron came up, possibly from a latent imported seed, but otherwise not to be accounted for. That the plant has been confounded with *Colchicum autumnale* (the "Meadow saffron") is evident by the description of it given by various authors, ancient and modern. Dioscorides, a physician in the earliest century of our era, describes it as an acrid poison, and Gerard ascribes to saffron potent qualities which it does not possess.[7] In many of the British Floras it is said to be indigenous, and even so eminent a botanist as Sir J. E. Smith has fallen into the error. Loudon makes no distinction between the two species, but our accomplished botanist Ray knew better; he says, "Nothing is known concerning its place of spontaneous growth, and no wild plant is to be seen where it had been cultivated two hundred years."

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[5] "Britannia," vol. i. p. 426. The passage is quoted at length in Gibson's "Flora of Essex," p. 312.—ED.

[6] "Herball," Ed. 1597, p. 123; Ed. 1633, p. 152. So also William Bulleyn in his "Government of Health" (1588)—"Our English hony and safron is better than any . . . ."—ED.

Saffron is said to be a mild aperient, but its medicinal uses are now confined to the measles and a few other complaints. The old-fashioned people of the last generation used it in mild cases, and rhubarb in more virulent ones. I well remember their medicine boxes containing both these drugs. A list of the prices as recorded in the "Liber Fraternitatis Sanctæ Trinitatis de Walden" may be interesting, but it must be remembered that money was then of far more value than now.

		£	s.	d.
1540.	For a pound of saffron to give my Ladye Pagett	0	12	0
1561.	A pound of saffron given to the Queen's attorney	1	5	0
1614.	Bought 4 oz. of saffron, 15s. 4d., bought a pound of saffron	3	3	4
1629.	Paid for v ounces and a half of saffron at 18d. per ounce	0	8	3
1653.	1 lb. of saffron presented to my Ladye	1	17	0
1661.	For a pound of saffron, paid Pratte for gathering the heads 4d.	3	10	0
1665.	Paid for a 1lb. 4 oz. of saffron	4	1	10
1689.	Presented to King William III., when he came to Audley End, 14 ounces of saffron, which cost	3	3	8
1717.	Paid for a silver salver to present some saffron to King George, £4 11s. Paid for the saffron	1	6	6

Saffron varied much in price in abundant or unproductive years, but from this time, from foreign introduction and from its disuse as a medicine, it rapidly declined both in cultivation and value. Probably I am almost the only man who has ever seen a field of saffron in bloom—that is, in this vicinity. The last of the saffron growers, with whom I was well acquainted when a child, was named Knot. He lived at Duxford, in Cambridge, about six miles N.W. of this town. He grew about half an acre, and made a journey once a year to dispose of his produce. In later years the journey was too much for him, and his friend, William Thurnal, acted for him. Up to 1816 he continued to grow saffron, and in 1818 the only remains of the crocus were to be found in his garden. I well remember the clay ovens and the sheets of white-brown paper used in drying the chives. In a conversation with his grandson some years after, he laughed at the notion recorded by Camden that the flowers should be gathered early in the morning, before sunrise. The only other saffron that I have ever seen was a bed in the garden of a celebrated amateur florist, Mr. Charles Baron. At his demise his garden passed into other hands, and the saffron failed. The saffron farmers were called, by way of distinction from other farmers, "crocurs," and from the uncertainty of the crop from disease in the bulbs, and the changes of this variable climate in September and October, the profits were very precarious, occasionally ruinous; which gave rise to habits of habitual discontent, and it may be inferred that the word "croaker," now a common appellation for a grumbler, was so derived! Saffron, in some shape or another, is still used in confectionery, probably only as a colouring matter, and for colouring butter and cheese.[8] In the county of Durham it is largely employed in the manufacture of biscuits, buns, and cakes. Such things, bought in the confectioners' and bakers' shops around Bodmin, Penzance, and Land's End, are coloured with saffron. Nothing of the kind is heard of here. In Ireland these cakes are well known and used. The late Lord Talbot de Malahide, as an inducement for me to visit him in Ireland, said he would treat me with saffron cakes; and Mr. Maynard informs me that in the Museum here lately an Irish lady said that saffron cakes were now extensively used in her country, especially in the neighbourhood of Dublin. The commercial value of saffron is chiefly for the dye which it affords.[9] There are many imitations of it, some of great beauty, but they lack the charm of the floral tincture. There is nothing analogous in nature to the delicately rich and beautiful tint which is supplied by the stigmas of the saffron blossoms, excepting the hue of early morn, to which the poet has referred:—

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[7] Ray does the same. "Synopsis" (Ed. 724), p. 374.—ED.

"How, when the rosy morn begins to rise,
And wave her saffron streamer through the skies."

I think it is a flower which might, with advantage, as a late autumn beauty, with its light violet or lilac blossoms, be introduced into our gardens.

I will now devote a few lines to the name of the town in connection with the saffron plant, and the time when it assumed its present prenomen. It never was a large town, but was an important one from its Castle and Monastery, and from being the only market for many miles round. In Doomesday it is called Waledana; on the earlier seals of the monastery it is Waledeni; in a later and better executed seal on a deed of 1534 (the seal may be earlier) it is still Waledeni, without a prefix. At different times the town has had other additions to its name, as Walden-burg, Brook Walden, Chipping Walden (Cheaping), which latter probably has much to do with the present name. A gentleman from the British Museum, on looking over some old deed, said: "I think I can help you; here is 'Seffing Walden'"; but I was doomed to disappointment; the parchment was stained and crumbled, and on closer inspection the word turned out to be "Chepping." Yet this raised the surmise, the town being the chief mart for the commodity, that this name, aided by the misspellings of the time, had gradually merged into saffron.

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[8] Shakespeare's reference to it ("Winter's Tale," iv. sc. 2)—"I must have saffron to colour the Warden-pies," indicates its common use for this purpose in his time.—Ed.

[9] "The chiues, steeped in water, serue to illumine, or, as we say, limne pictures and imagerie, as also to colour sundry meats and confections."—Gerard.—Ed.

On a seal attached to the charter of Edward VI., 1549, is depicted three *brooms*, intended for saffron flowers, surrounded by a wall, forming the miserable pun of "Saffron Wall'd in"; this is the earliest record I can find of the prefix, nor does it appear to have been used before the year 1530. The Corporation were very unwilling to adopt it; their Election book makes no use of the prefix until 1729.[10]

When the present seal of the Corporation was fabricated the saffron blossoms were depicted more naturally than in the 16th century. A late lord asked whether the heraldry had not been spoiled, but his lordship was reminded that his family were going to replace the Griffin supporters of his arms by Lions, and he was asked if he intended to have the long cat-lizzard like lions of Edward III., or natural animals? The only response was a shrug of the shoulders. An old heraldic painter who had been accustomed to depict the ancient form of lion, was anxious to see a living beast, and when the Zoological Gardens were first opened went there. On being shown one, he disputed rudely with the keeper, and left in great anger, believing he had been hoaxed. On entering what may be said to be almost a public room in the town (connected I may say, with a most accomplished British botanist, now, alas! no more), the visitor is confronted with a frieze running round it of what may be surmised to be plants of the genus *Orchis*, but he is surprised to be informed that they are intended for our celebrated plant saffron. Again, the fabricator of the effigy on the east wall of the new town hall has strictly obeyed the injunction "Thou shalt not make to thyself the likeness of anything in heaven above or in earth beneath." Eight saffron heads will be seen in the spandrels of the arches in Walden Church, exactly opposite the north porch.

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[10] The plant has also given its name to Saffron Hill, formerly part of Ely Gardens, Holborn; to Zaffarano in Sicily; and to Zafaranboly in Anatolia.—ED.

Another incident connected with the name of the town may amuse; there is a phrase "Saffron Walden, God help me," heard all over the kingdom, in the wilds of America, and even in Australia. When the almshouses were re-established in the reign of Edward VI. the recipients of the charity had but a miserable pittance, and had a licence from the King to beg. As this was soon after the Reformation, when so many priests were reduced to mendicity, and were wandering about holding out their hands, "A poor priest, God help me!" so the licensed recipients of the Walden charity, when asked where they came from, exhibited their licences with "Saffron Walden, God help me!" and seeing that this freed them from prison, other beggars adopted the cant words. In a manuscript that I have on the dissolution of Tiltey Abbey, near Thaxted, Father Thomas, a favourite priest, was allowed 4s. 6d. a week from the parish of Thaxted, the others were reduced to beg their subsistence. *Deo adjuvante floremus* appears to be a Latin parody of the beggars' phrase.[11]

Notes on the Geology of Chelmsford and neighbourhood.—*London Clay* is worked at Broomfield and Widford for drain-pipe and brick-making, where it is found about five or six feet from the surface. At Widford it abounds with crystals of selenite, which are apt to cut the fingers of the workmen. Among the organic remains found are sharks' teeth and the vertebræ of fish, crustacea, a large *Nautilus*, and two species of *Fusus*. Stems of plants and wood bored by *Teredo* are not uncommon. It is interesting to note that of Palm-fruits *(Nipadites)*, usually so common in the London Clay, not a single specimen has hitherto been recorded. The fossils of the London Clay at Broomfield are nearly identical with those found at Widford. The so-called "coprolites" abound at the former place. "*Brick-earth*," containing *Gryphæa incurva* and *G. cymbium*, is worked in many places. [Mr. Horace B. Woodward, F.G.S., of the Geological Survey, informs us that this so-called "Brick-earth" is the "Chalky Boulder-clay;" brick-earth of ordinary character being worked at Moulsham.—ED.] The *Drift-Gravels* at Broomfield contain many Ventriculites. Among them are *Ventriculites radiatus*, *V. quincuncialis*, *V. striatus*, *Brachiolites convolutus*, and *B. racemosus*. Flint casts of Echinoderms and shells are common. Among the rocks found are sandstones and limestones of various ages, granite, syanite, and conglomerate. In the Drift-gravel at Broomfield a flint "scraper" has been found, and in the Valley-gravel near Admiral's Park, about 150 yards from the river Cann, several worked flints, including an arrow-head, have been discovered. In the collection at the Essex and Chelmsford Museum are some very fine teeth of *Elephas primigenius*. They were discovered in making the railway at Widford, and were probably derived from the gravel. One of the specimens weighs twenty-eight pounds, and is in beautiful preservation.—F. CHALLIS, Chelmsford, February, 1886.

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[11] I also can recall the proverbial use of this phrase. My mother would sometimes quote a saying of my grandfather's, who was a Norfolk man, descriptive of any importunate person:—"He's only a Saffron Walden God-help-us."—W. COLE.

THE LIBRARY TABLE.

[UNDER this heading it is intended to give, from time to time, short notices of books, or other publications concerning Essex, or which may treat of matters of special interest to us as a County Society. As the number of Essex books issuing from the press is very limited, and the books themselves are often of varied contents, it is not proposed to exclude any from notice in our pages on the plea that their principal subject-matter is outside the scope of the Club, our object being to call attention to publications which may serve in any way to illustrate the county, its history and inhabitants, in times past and present.—ED.]

"**The Ancient Chapel, dedicated to St. John the Baptist, in the town of Epping . . . . &c.**"—By Benj. Winstone, F.C.S., F.G.S., F.R.M.S.; 4to. pp. 122 and Postscript, pp. 15. With maps, plans, transcripts of deeds, and other illustrations. London, 1885. [Printed for private circulation only.]

EPPING STREET, from Winstone's "Ancient Chapel of St. John, in Epping."

This volume, which has been recently prepared by our member, Mr. Winstone, owes its origin to the desire to preserve in the durable guise of print the deeds and other documents belonging or relating to the Chapel of St. John at Epping. Mr. Winstone undertook to have these printed at his own cost, and extending his plan by the introduction of explanatory matter, by adding maps, plans, &c., the result is the handsome book before us. The bulk of the volume is necessarily occupied with details of the legal, ecclesiastical, and financial history of the building; but Mr. Winstone has interpolated amid his deeds and grants so many interesting scraps of information respecting the topography, archæology, and history of the Epping district, that we are sure our readers will thank us for directing attention to the book. Among the plates are representations of "Epping Street" in former times and now; maps of parts of Hertfordshire and Essex from the "Britannia," and an excellent reproduction, by the photo-lithographic process, of Norden's map of Essex, 1594. This last map, by Mr. Winstone's kindness, will shortly be published in the ESSEX NATURALIST.

Concerning the Hamlet of Epping Street, or Heath, the author gives the following observations:—

"The boundaries of the settlement or lordship seem to have been in the west, the Bury Lane, Lindsey Street on the east, and towards the north the lane now known as Love Lane, which runs from the Bury Lane to Lindsey Street, and appears to have been the boundary between Tippendene and Epping Heath. But the question presents itself—why was a cold, exposed situation, open to the effects of every wind, selected for a settlement of freemen, contrary to the custom which prevailed, of choosing sheltered places for villages, as well as for manor houses, when so much land, in situations sheltered by hills, like that occupied by Coopersale, Theydon Bois, Weald Gullet, or Potter Street, remained Folkland, and at the disposal of the King, with the consent of the Witan, or assembly of freeholders? For an answer, attention becomes directed, by Reynold's bequest, to a *beacon* which he mentions as standing "near to the common road towards London." Assefield deriving its name from the Anglo-Saxon word "asce," or "ahse," ashes or cinder, points out the more exact position of the Beacon to have been either in it or its immediate vicinity. The importance of the spot for such a purpose is manifest, for from it, looking down the valley of the Roden, can be seen the Kentish hills . . . so that a signal-fire on the Kentish hills could be repeated on Epping Heath, and convey intelligence to the neighbouring manors; and even the Hertfordshire hills can be seen from the other side of the ridge, not many yards distant, through a break in the hills, which form the Uplands . . . The town of Epping, then, may have had its origin in the settlement on the heath of a few freemen, whose duty it was to find the wood and attend at the Beacon, as the services rendered to the King for the land which they occupied in his lordship; and it may not be going too far to suppose a Saxon king, some time during the number of years in which the Danes made frequent inroads into England, recognised the importance of the position for signalling the approach of an enemy or for calling together the freemen who had to render military service; and for that purpose formed the settlement."

Only one hundred impressions of the book were struck off, but the author has generously placed copies in the libraries of the Loughton Public Hall and the Essex Field Club.

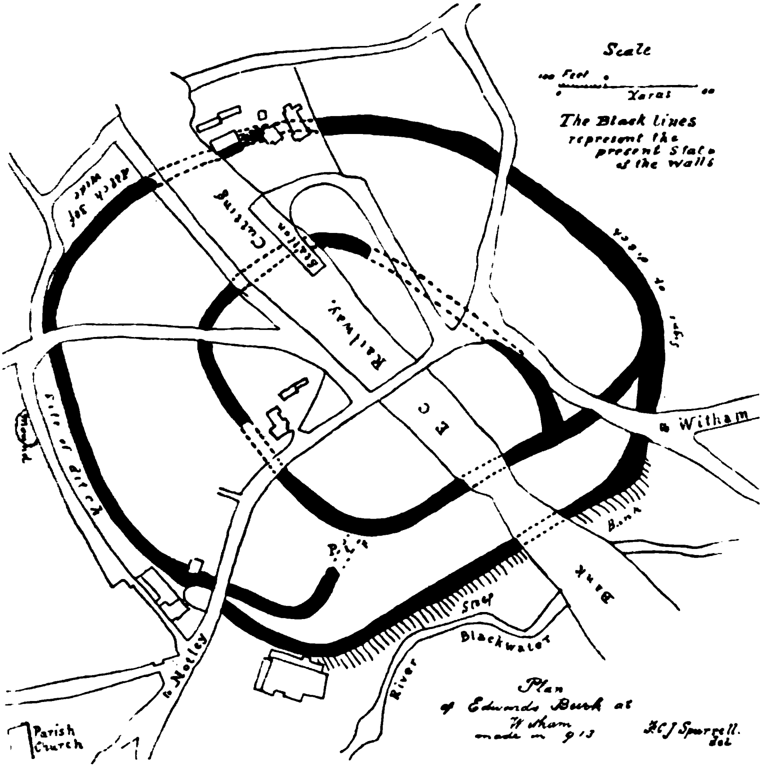
Fungi for Church Decoration.—When visiting near Maidstone two or three years ago, I was struck with the beautiful effect produced by a judicious use of Fungi in ecclesiastical decoration. It was "Harvest Festival" at the village church. Each inside window sill was thickly bedded with moss and ferns, and a few brightly-coloured fungi were inserted at short intervals; a similar combination was used round the pedestal of the pulpit. The result was charming, all the more so because it was *natural*. The species employed most freely was the brilliant *Agaricus muscarius*, which grows in great profusion around and about. I frequently found in the neighbouring woods decayed specimens measuring fully nine inches across the pileus. Is the Kentish Rag formation specially suitable for this species? It certainly is so for most kinds of *fruit trees*.—A. LOCKYER, Woodford.

WITHAMBURY.

By F. C. J. SPURRELL, F.G.S.

[*Read at Field Meeting at Witham, July* 25, 1885.]

THIS camp is one of those which should be studied with care. Of the many thousand "camps" or enclosures, consisting of earthen walls, there are very few whose plan we can trace with certainty, and ascertain the date of construction and the builder's name. Of these even, some have grown out of recognition by subsequent improvement, and few indeed remain as simple camps.



PLAN OF WITHAMBURG. From a survey by Mr. F. C. J. Spurrell.[1]

It appears to me that every opportunity should be taken of studying the plan and features of construction of such works as this, whose name and date and shape and maker we know, and in the criticism of which there is no possibility of calling it Roman or Celtic, or Danish, even by the most enthusiastic antiquissimists.

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[1] [We are indebted to Mr. Spurrell for this photo-etching.—ED.]

The "English Chronicle" tells us:—

> A.D. 913. "And then" (after the Hertford Burg was finished), "during the summer between Rogation days and midsummer, King Edward went with some of his forces to Mældune in Essex, and there lived the while the Burg at Witham was wrought and *getimbred* (built.)"

During frequent visits to this camp in the winter times, I have been able to follow out the general outline of the walls. As will be seen by the annexed plan they present a rounded outline, or the camp might perhaps be more correctly described as a square with much rounded corners. Within the larger circuit is an inner wall, having nearly the same shape as the outer one, and placed at a regular distance from it. On the south-west side, or that on which the River Panta runs, the hill-side is very steep; on the other sides the land slopes gently from the middle of the camp. The situation was undoubtedly a very weak one, from a military point of view. On that side facing the river there were two walls joining the inner and outer ones, as if marking a second or third subdivision,[1] and on the least accessible side. But these are very faintly seen now: here and there faint signs of a ditch may be traced. The ditches were, of course, dry; about thirty feet wide, and of slight depth. In one or two places where I have been able to examine them, they did not exceed three feet deep, except on the side towards the church, and there apparently the depth was much greater. This increased depth was needed in consequence of the ground not falling away in that direction.

As usual, the banks were made of the material thrown out of the ditches; and the height was regulated by the necessities of the case, and the banks varied in this respect. I should think that, measured from the inside, the average height was seven feet.

Whatever general meaning became subsequently attached to the verb "getimbrian," the word "getimbred" as used in the "English Chronicle" in this case (and others like it), meant "*wooden construction.*"

The burg, or bury, was a fortification, or military post. Where the Saxons constructed a stronghold, or military station, to hold an army or garrison, they put up timber walls and towers, with huts for the men, and a "Hall" for the commander. For King Edward was, doubtless, reserved the inner camp, with a building suitable to so successful a warrior king, then in the act of receiving the submission of his foes. Of course the inhabitants lived around, but outside the garrison enclosure. The wooden walls, consisting of whole trees and large timber, were so placed that the earth could be thrown up against them, and we find that the time necessary for this construction of the camp did not exceed eight weeks.

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[1] Danbury has three divisions.

Edward probably encamped in the open at Maldon, whose Burg was not constructed until seven years after that at Witham (in 920. A.D.).

"Town" is not the word by which Burg should be translated. The town was not fortified until it became of sufficient importance to need walls. Even in our day, a "*Town*" is considered to be promoted in the social scale when it gets a "corporation" and becomes a *Borough*.

In building new Burgs, and rebuilding others which had been destroyed, "The Lady" of the Mercians and King Edward were very busy. In the five years from 910 to 915 A.D., "The Lady" built ten Burgs; and King Edward, between A.D. 913 and 924 *getimbred* twelve Burgs, and one besides he "wrought with stone walls." In Edward's reign, only one Burg is recorded as having been constructed by his enemies. It seems to me certain that more camps were constructed, both by the King and the Danes, than are recorded in the Chronicle. The Burg of Danbury bears a considerable resemblance to that of Witham, in its plan, and if omitted by accident from the list of Alfred's and Edward's camps, may well have been a stronghold of the Danes of this period, whose practice and knowledge of warfare was similar to that of the Saxons.

[This camp has been, of course, attributed to the Romans, on the faith of two coins of the Emperors Valens and Gratian, said to have been found years ago by a Mr. Barwell, when levelling part of the ramparts; but, as Morant hints, this is a slender basis of fact on which to identify the spot with Antonine's Station, *Ad Ansam*, inasmuch as Roman coins and remains are found abundantly scattered over the country hereabouts. We are informed by Col. Lucas that in the course of cutting through the earthworks in making the Great Eastern Railway, three iron weapons were found, besides some human remains. "They were about four feet in length, with a kind of blade about nine inches long, and one in thickness, and rounded at the end; the opposite end or handle terminating with a circular knob, like an ordinary poker. They were so much corroded that it was difficult to come to a correct conclusion as to their original thickness; but they had no indication of ever having been sharp at the sides or at the point." We understand that these weapons are now in the Essex and Chelmsford Museum.—ED.]

A REPORT ON THE FLOWERING PLANTS GROWING IN THE NEIGHBOURHOOD OF COLCHESTER.

BY J. C. SHENSTONE, F.R.M.S.

MORE than twenty years have passed since the publication of Gibson's "Flora of Essex"—a period sufficiently long to allow of changes in the vegetation of the county. Many of Gibson's plants have been lost sight of, and others, previously overlooked, have been found. I therefore venture to place before the Members of the Essex Field Club some notes on the botanical work accomplished in one important district of the county in recent years.

I regret that I am able to devote but little time to my favourite pursuit, and the following notes are, therefore, far from complete; but I thought it best to submit them to the Club as a record of my work so far, and, as opportunity occurs, to extend them hereafter.

Reference to Professor Boulger's map of his proposed division of Esssex into floral districts (Trans. Essex F. Club, vol. ii., plate vi.) will show that Colchester is conveniently placed for the study of the eastern portions of the districts 5 and 6; and if a line be drawn through those districts from Bures to Mark's Hall, the parts of the county in which my work has been done will be included in the eastern areas of the above districts. I have naturally worked the immediate neighbourhood of the town most thoroughly, but in the case of a few rare plants I have recorded habitats situated beyond the above defined boundaries.

Gibson's "Flora" is taken as the basis of my work, and I have frequently been much struck by its accuracy and completeness. I have followed his arrangement of the species, in order to avoid confusion. The paper is too fragmentary in character to allow of any discussion or criticism of Gibson's nomenclature and classification.

On occasions when visits to the neighbourhood by the Club have been proposed, I have been puzzled to choose the direction in which the most interesting botanical excursion could be directed. Although about 780 species of flowering plants have been recorded within my limits, a fair proportion being uncommon, or otherwise notable species, yet the more interesting plants are so scattered that but few of their stations could be included in one day's excursion. There is a fine piece of coast line to the east, most points of which are within reach of railway stations; this is bounded by extensive stretches of "saltings" and marsh lands. These saltings would, I am convinced, well repay a thorough investigation. But few botanists have been resident in the district, and, the marshes being very extensive and but little explored, there is every chance of some new plants rewarding a persevering search. Parts of this coast are rich in forms of *Atriplex*, which would well repay working out by any botanist who would undertake the task. At Berechurch, two miles from Colchester, is a sandy tract, on which grow the very rare *Filago gallica* and other interesting plants. I regret to say that Bergholt Heath has been for some time entirely under cultivation, and many good plants consequently exterminated.

I will first give a list of the plants which have been found since the publication of Gibson's "Flora," and which were not recorded by him for my district.

No attention seems to have been given to the Batrachian Ranunculi by Gibson's co-workers in the Colchester district. These plants will need a very careful examination, and as the opportunities I get for working at a distance from the town are few, to obtain a complete series of all our forms will be a work of time. I have, however, gathered the following, for naming which I am much indebted to Mr. Henry Groves :—

Ranunculus peltatus, Fr. var. *truncatus*. At Bourne Ponds. Var. *floribundus* of Hiern. Mon. (probably Prof. Babington would not admit it as his species) occurs in a pond near Colchester.

R. diversifolius, Gilib., var. *godronii*, occurs in a pond at Thorington, and in a pond at Layer Heath.

R. drouetii, Schultz, in a dyke on the marshes near Walton Hall.

R. baudotii. Godron. Pond near Mersea Strood, and dyke on marshes near Walton Hall.

In addition to the above, the following localities for Batrachian Ranunculi have been given to me by the Rev. J. D. Gray :—

R. circinatus, Sibthorp. Common in the Stour.

R. peltatus, Fr. var. *penicillatus.* Millstream at Nayland.

R. baudotii, Godron. Catawade-on-the-Stour. Var. *confusus,* Dovercourt.

R. tricophyllus, Chaix. Millstream near Nayland.

R, hederaceus, L. In a ditch at Braiswick, and has been found by Miss M. Gripper on Layer Heath, and at the edge of a pond at Walton-on-the-Naze.

Eranthis hyemalis, Salisb. Occurred some years since on the Stour at Mistley in Essex, but I have not been able to visit the station recently. It also grows just over the border of the county, at Stoke in Suffolk.

Papaver somniferum, L. Recorded by Rev. J. D. Gray at Clacton-on-sea.

Corydalis lutea, DC. Occasionally found upon old walls in our district.

Fumaria pallidiflora, Jordan. At Wrabness (1885).

Lepidium draba, L. Found at the Hythe, Colchester, by Mons. Tempère, in 1877.

Reseda lutea, L. Has been found at Lexden by Miss Folkard; it is probably a chance introduction.

Silene Otites, Sm. On several walls in Colchester, but it was introduced by local lepidopterists, as food for their caterpillars.

Stellaria media, With., var. *neglecta.* This form has been found in the High Woods near Colchester.

Linum usitatissimum, L. Occurs plentifully in the railway cutting near Marks Tey, but the plant is no doubt an introduction.

Special Notices to Members.

Subscriptions for 1887 are *now due,* and up to the middle of February should be sent to the Hon. Treasurer, Andrew Johnston, Esq., Woodford, Essex. Post Office Orders should be made payable at the Post Office, Lombard Street, London, E.C., and Cheques should be crossed "Prescott & Co." In the February Number of the Essex Naturalist, the Address, Official Notices, &c., of the new Treasurer will be given.

Important Announcements respecting the Publications of the Club.—At a meeting of the Council, held on December 10th, 1886, the Secretary was requested to make known to members the following resolutions :—

> "That in future the publications of the Club be not sent to Members more than three months in arrear with their subscriptions. And that the Council will not recognize any claims by Members for back parts of the Essex Naturalist, or other publications of the Club, *unless application for the same is made within six months from date of issue of the said publications.*"
>
> "In March in each year a notification shall be sent to each Member in arrear, either in the Essex Naturalist or otherwise, that his or her subscription is not paid, and in the event of the subscription not being paid before the publication of the April Number of the Essex Naturalist, *that number shall not be sent to such Member in arrear.*"
>
> "That notice be issued in January next that the Council will not recognize any claims by Members for back parts of the old series of "Transactions" and "Proceedings," unless such claims be sent in to the Librarians on or before the 28th February, 1887, on which date stock will be taken of the publications of the Club between 1880 and 1887, *and their issue except by sale will be finally closed.*"

"Transactions," Vol. IV.—With this number of the Essex Naturalist is sent out Part 2 of Vol. IV. of the "Transactions," completing the old series. The "Proceedings" will be pushed on at once, and will include reports of all meetings of the Club *up to and including the Seventh Annual Meeting.*

Author's Separate Copies.—Authors who require copies of their articles are requested to send a written order to Messrs. W. H. & L. Collingridge, care of the Editor, *with the proofs*; otherwise the type may be distributed before the order is received. The charges for separate copies are as follows :—

2 pages	25	copies	4s.	4 pages	25	copies	5s.	8 pages	25	copies	8s. 0d.
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A greater number of pages to be charged in equal proportion. Separate Titles, Wrappers, &c., extra.

Forthcoming Meeting of the Essex Field Club.

[Announcements of forthcoming Meetings of the Club will, for the future, be made in this place; but should any special necessity arise, postcards or circulars will be sent out as heretofore.]

THE SEVENTH ANNUAL GENERAL MEETING of the Club will take place at the PUBLIC HALL, LOUGHTON, ESSEX, on SATURDAY EVENING, JANUARY 29th, 1887, at Seven o'clock. The Report of the Council for the year 1886, and the Treasurer's Statement of Accounts, will be read and submitted to the Meeting. The Election of New Members of the Council and Officers for 1887, will also take place, in accordance with Rules III., VI. and XVII. A printed ballot list is enclosed in the present number of the ESSEX NATURALIST.

The ANNUAL PRESIDENTIAL ADDRESS will be delivered by T. VINCENT HOLMES, F.G.S., M.A.I., &c., as follows:—

"THE PAST AND FUTURE OF THE ESSEX FIELD CLUB."

An ORDINARY MEETING (the 74th) will also be held for the proposal and election of New Members.

At the Meeting on December 18th, notice was given by the Secretary of his intention at the Annual Meeting to move (on behalf of the Council) the following alterations in the Rules:—

> *In Rule VI. to strike out the words* "Librarian and Assistant-Librarian," and substitute the words "Three Librarians."
>
> "*In Rule VIII. the last sentence to be altered to read thus:* "The Certificate shall be read from the Chair at the Ordinary Meeting following its receipt by the Secretary, or published in the next succeeding number of the ESSEX NATURALIST, and the Candidate balloted for at the next following Meeting (not being a Field Meeting), one black ball in six to exclude."

WILLIAM COLE,
Buckhurst Hill, Essex. *Hon. Secretary.*

New Members.—The beginning of the year is the most suitable time for joining the Club. The Secretary will gladly send full particulars, with forms of proposal, &c., to anyone willing to aid the Society by increasing its roll of members.

N.B.—The attention of Members is directed to several important notices on page 3 of the Wrapper.

City Press: W. H. & L. Collingridge, 148 & 149, Aldersgate Street, London, E. C.

NO. 2.] *Price, with Map, to Non-Members, 1s. 6d.* [FEBRUARY, 1887

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The
Essex Naturalist:

BEING THE

JOURNAL [“TRANSACTIONS” AND “PROCEEDINGS”]

OF THE

ESSEX FIELD CLUB.

EDITED BY

WILLIAM COLE,
Honorary Secretary.

With this Number is sent out a fac-simile reproduction of Norden's Map of Essex, 1594.

Contents:

PAGE

Report on the Flowering Plants Growing in the Neighbourhood of Colchester—By J. C. Shenstone, F.R.M.S. (*Concluded*) 25

Note.—Early British Urns near Nayland Suffolk, and Wix, Essex—Henry Laver 35

“ **Primæval Man in the Valley of the Lea** ”—By Worthington G. Smith, F.L.S., M.A.I. (*With Two Illustrations*) 36

“ **On the Subsidence at Lexden, near Colchester, in 1862.**”—By Rev. O. Fisher, M.A., F.G.S., *and* T. V. Holmes, F.G.S. 39

Notes.—*Hypochæris glabra, L.;* Living Barometers—A. Lockyer; *Sparganium neglectum*, Beeby, in Essex.. 40

John Norden's Map of Essex. (*With Photo-lithographed Map and Facsimile Extract*) 41

Notes.—*Melilotus arvensis*, Wallr. at Walthamstow—J. T. Powell; Supposed occurrence of the Osprey at Maldon—E. A. Fitch, F.L.S.; Bones of Palæolithic Man—T. V. Holmes, F.G.S. 45

The Deer of Epping Forest—By J. E. Harting, F.L S., F.Z.S. (*Commencement*) .. 46

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Genista anglica, L. This plant has been found by Mr. W. H Harwood at West Donyland, and the observation has since been confirmed by myself. The locality was formerly a heath, and in all probability the plant was widely distributed in former times. The few patches of the *Genista* now remaining, with those of *Eriophorum polystachyon* mentioned below, are the last representatives of a more or less varied heath and bog flora which once flourished on the spot. *G. anglica* has also been found by Miss M. Gripper at Layer Breton Heath.

Medicago sativa, L. Purple Medick is occasionally found in District 8; it is doubtless here, as in other parts of the county, an escape from cultivation.

Lathyrus macrorrhizus, Wimmer. Previously unrecorded for this district, has been found at Birch by Miss M. Gripper.

I have commenced collecting material for a list of **Roses** in my district, but will defer any remarks upon this very difficult genus until a later report. The following forms have been found in Essex by the Rev. J. D. Gray:—

Rosa tomentosa, Sm. Ardleigh.

R. rubiginosa, L. Boxted, frequently.

R. lutetiana, Leman. Boxted.

R. andegavensis, Bast. Great Horkesley.

R. sphærica, Gren. Great Horkesley, 1884 (Rev. E. F. Linton).

R. verticillacantha, Merat. Great Horkesley, 1884 (Rev. E. F. Linton).

R. collina, Jacq. Hedge by road leading from Colchester to Nayland.

R. decipiens, Dumort. Great Horkesley.

R. arvensis, Huds. Boxted.

Poterium sanguisorba, L. I have found this on railway banks near Colchester.

Fragaria vesca, L. The wild strawberry is a very common plant with us, occurring in almost all our woods. I am quite at a loss to explain how it came to be overlooked in this district by Gibson's co-workers.

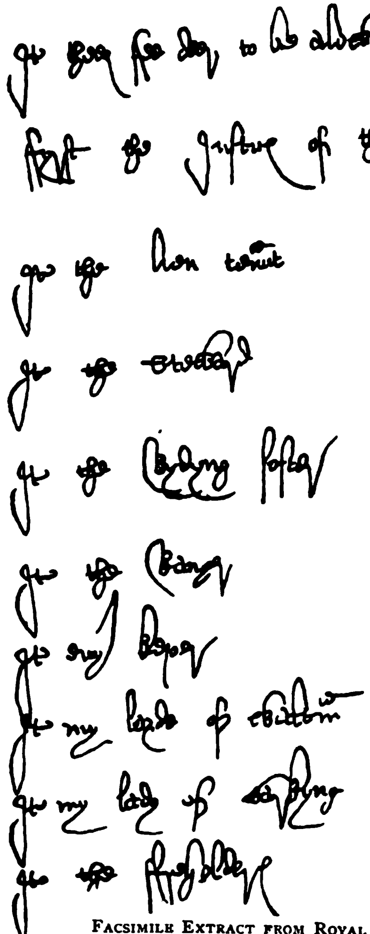
IT. That every keper observe ther articles upon peyn of the forfeture of his offyce, and that upon dew examynacion and dew proof hadde byfore the lieutenant, Rydyng forester, Ranger, and Steward of the Swanymote, the sayd offender to be dischargyd of the exersyng of his sayd office tyll the Kyng's plesure be further knowyng. [*Sic.*]

IT. Thees fee deer to be alowed as hereafter folowyth :—

Fyrst, the Justices of the Forest.	It. The Ranger.
It. The Lieutenant.	It. Every Keper.
It. The Steward.	It. My Lorde of Waltham.[10]
It. The Rydyng Foster.	It. My Lady of Barkyng.[10]

It. The Freholders.

[The last few lines of the manuscript have been reproduced by photo-zincography, from a tracing prepared by Mr. Harting.—ED.]



FACSIMILE EXTRACT FROM ROYAL ROLL, *temp.* HEN. VIII. Reduced. Two-thirds size of original.

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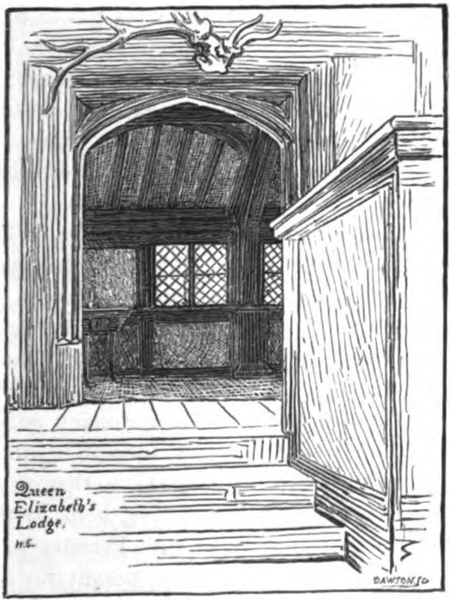
[10] The assignment of a fee deer to the Abbot of Waltham and the Abbess of Barking, shows that these regulations were framed prior to the dissolution of the monasteries in 1536.

Dr. Nott, in his Memoirs of the Earl of Surrey,[11] relates a story to the effect that Henry VIII. (in whose reign these rules were made) was actually hunting in Epping Forest at the time of the execution of his second queen, Anne Boleyn :—"On the fatal morning," he says, "Henry went to hunt in Epping Forest; and while he was at breakfast his attendants observed that he was anxious and thoughtful. But at length they heard the report of a distant gun—a preconcerted signal. 'Ah! it's done,' cried he, starting up; 'the business is done! Uncouple the dogs, and let us follow the sport.' In the evening he returned gaily from the chase, and shortly afterwards married his late queen's maid of honour, Jane Seymour."



Staircase in Queen Elizabeth's Lodge, Chingford. *From Buxton's "Epping Forest."*

Queen Elizabeth, who was very fond of seeing deer coursed with greyhounds, and of shooting a buck with a cross-bow as it was driven towards her, paid many visits, we may be sure, for the enjoyment of her sport, to a forest like this, so near the seat of government, and hence easily reached. It is on record that in May, 1578, she was entertained here for several days by the Earl of Leicester at Wanstead House. Indeed, in the building at Chingford known as Queen Elizabeth's Lodge, we have a picturesque memorial of the days when she hunted in the Essex woodlands.[12]

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[11] "The Works of Henry Howard, Earl of Surrey, and those of Sir Thomas Wyat the Elder;" edited by G. F. Nott, D.D., with a Preface, Memoirs of the Earl of Surrey, etc. Two vols. 4to. London, 1815-16.

James I. hunted both red deer and fallow deer in the forests of Epping and Hainault, and is said to have imported some fallow deer of the dark variety, now seen in the forest, from Norway, some of which were turned out at Epping, others in Enfield Chase. This importation, however, was not the origin of this dark variety in England, as has been stated by Bell, in his "British Quadrupeds," and other authors; for, as I have shown elsewhere,[13] Leland had noticed these dark-coloured fallow deer in Henry VIII.'s time; and long before that even, namely in 1465, they existed in Windsor Park, as I discovered from a curious diary of travels of the Baron Leo von Rozmital, brother to the Queen of Bohemia, who visited England in that year.

The officers of the forest were, the Chief Justice in Eyre, who held a periodical court, or justice-seat, at which offences against the forest laws were tried and disposed of; the Steward, Ranger, Foresters, and Keepers. There were two Chief Justices in Eyre for the Royal forests, one acting north, the other south, of the Trent. They were always peers, and were assisted by the common law judges at Westminster.

The De Veres, Earls of Oxford, were for many generations hereditary stewards of the Forest of Essex, succeeding the Clares, who were stewards from the reign of Henry III. to that of Edward III.

The office of King's Forester was long held by the Archers of Copped Hall. It was the duty of the Forester to preserve the boundaries of the forest intact, and to permit no encroachments within them. Should a neighbouring landowner desire to free his woods from the view of the Foresters and Regarders, to cultivate a portion of them, or to enclose a park, and kill the game on his own manors, he had to obtain the royal permission: and an official writ was addressed to the Forester on the subject. Such a writ, on behalf of the Abbey of St. Edmund-at-Bury, was dispatched from Oxford to Sir Richard de Montfitchet on the 20th July, 1216. By it he was informed that a charter had been given to the abbot and monks there serving God, granting that their woods at Harlow, Stapleford, and Werketon, should be for ever free from regard, waste,[14] and view of the Foresters and Regarders, and that the abbot and monks should have the use of the same woods at their own will, except always driving forth the game. And on the same day, under another writ to De Montfitchet, free warren was granted for ever to the Bishop of London and his successors in his manor of Clackington, and that of Walton-cum-Thorpe, which is the manor of the Chapter of St. Paul's, London. Also that the said bishop and his successors for ever had full liberty *to take stags and hinds*, and all sorts of wild animals within the limits of the said manors. The Forester was also commanded *to make two deer leaps*[15] in his great park at Ongar, as he had right and custom to have. And also about the same time Montfitchet received the following mandate:—"We command you to allow the Abbess of Barking her reasonable estovers[16] in her wood at Hainault for her firing, her cooking, and her brewing, if she has been accustomed so to do in the time of our Lord King John our father; also to permit the same abbess to have her dogs to chase hares and foxes within the bailiwick if she was accustomed to have them in the time of our aforesaid father."

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[12] Queen Elizabeth, in one of her visits to the lodge bearing her name, is reported to have granted to the poor of several adjoining parishes the privilege of lopping wood. The custom was for the possessors of that privilege to assemble on the eleventh of November in each year, in order to strike an axe into the boughs of the trees at the hour of midnight. This right was also exercised upon parts of the forest which have been for many years enclosed, and extended in full operation till the twenty-third of April in the following year.

[13] "Trans. Essex Field Club," vol. 1, p. 84.

The Forester also had charge of the venison; as may be shown by a few examples from the close rolls. "The King to Richard de Montfitchet (1217), greeting:—Know ye that we have given twenty deer to our faithful and beloved Hugh de Nevill, to re-stock his park at Halingbury." In December, 1223, Robert Fitzwalter was to have ten live deer to stock his park at Royden. The next day an order was issued to give ten live deer to Henry Fitz-Archer, to stock his park at Epping. Another time Geoffrey, Bishop of Ely, was to have ten does and two stags.

Another duty of the Forester was to accompany, either in person or by deputy, those who had a right to kill deer or other game in the royal forest. By the first forest charter of Henry III. it was granted that "whatever archbishop, bishop, earl, or baron shall be passing through our forests, it shall be lawful for them to take one or two deer, by the view of the Forester, if he shall be present, if not, he shall cause a horn to be sounded, lest it should seem a theft."

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[14] Waste of the forest is where a man cuts down his own woods within a forest without license of the king, or chief justice in eyre.

[15] For an explanation of this term see an article by the present writer on "Deer-leaps, their Signification, Position, and Construction," in *The Field*, 19th Jan. 1884, p. 83.

[16] Estovers, a law term signifying necessaries or supplies, from O. Fr. *estoveir*, *estovoir*, to be needful.

There were formerly fourteen "walks," or as we should now call them, "beats" in Epping Forest, as follows—Waltham Forest, Chapel Hainault, West Hainault, Woodford, Walthamstowe, Leighton, Loughton, Chigwell, Lambown, Highwood, Epping, Waltham Abbey, New Lodge, and Chingford. To each of these beats a Chief Forester was appointed with a keeper under him. This enables us to understand Shakespeare's allusion in the "Merry Wives of Windsor," where Falstaff, describing how he would be cut up and divided like a "brib'd buck" (that is "a stolen deer"), gives one portion to "the fellow of this walk" (that is the keeper) as his fee.

In the early part of the last century the deer of Epping had very much decreased in number, owing partly to the demands or claims made for "fee deer," partly to the depredations of a gang of poachers known as the "Waltham blacks,"[17] who surreptitiously carried off numbers; and it appears by the Court Rolls of that date that an order was made to the effect that the stock of red and fallow deer being so low that they were likely to be extirpated, no more were to be taken for three years.

With regard to records nearer our own time, I have been favoured with a sight of some interesting documents relating to the deer in Epping Forest, in the possession of the Rev. J. W. Maitland, of Loughton. Amongst these the following may be specially mentioned:

(1) An appointment of John Maitland in 1812 to the office of "Chief Forester of West Hainault Walk, in the Forest of Waltham, otherwise called the Forest of Essex," with power to appoint an under-keeper "to attend upon his Majesty's vert and venison." Hainault was not disafforested until 1851.

(2) A notice dated 1809 from the Right Hon. Thomas Grenville, Chief Justice in Eyre, intimating that it was forbidden to hunt the fox or hare in the forest with any pack of hounds or beagles; or to hawk any pheasants or partridges; or to fish, or fowl, or to kill any manner of beast or fowl of forest, chase, park or warren, without application first made to him for that purpose.

(3) A license dated 1802 to hunt and shoot in the forest, red and fallow deer only excepted, provided that he use the liberty with that moderation which is fitting.

(4) A warrant for killing deer under the hand of the said Right Hon. Thomas Grenville in the words following: "On sight hereof you are to kill and deliver to the bearer for the use of the Hon. Miss Grimston, one fat doe of this season, for which this shall be your sufficient warrant. And herein you are not to fail.

"Given under my hand this 13th day of November, 1823.

"THOMAS GRENVILLE."

To come now to the deer themselves, of which there are three species. "The stag" (says Holinshed,[18] that is, the red deer) "is accounted for the most noble game; the fallow deere is the next; then the roe, whereof wee have indifferent store."

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[17] See White's "Selborne," Letters VI. & VII., to Pennant.

[18] Chronicles, i., p. 380.

There can be no doubt that at one time all three kinds flourished in the great forest of Essex. The roe was the first to disappear, then (early in the present century) the red deer, leaving the fallow deer the sole surviving representative of the genus *Cervus* in this forest. The precise date of the disappearance of the roe from Essex it is impossible to determine. We know that it once existed here, from the discovery of its remains at various times in the deposits of the Thames Valley,[19] and from allusions to it in ancient charters and Court Rolls; but it had apparently ceased to do so some time before John Norden wrote his Survey of Essex in 1594, for he makes no mention of it, although he names both the red and fallow deer as inhabiting the county.[20] It is evident from Norden's concluding words in his reference to the deer, that he considered the privileges which the "neighbors" enjoyed in the shape of firewood and pasturage on the wastes of the forest might well compensate them for the damage done by deer in trespassing occasionally upon their holdings.

The red deer, however, from their greater habit of straying off the forest, and damaging the farmers' crops, were naturally much "poached;" and although an attempt was made to preserve them as long as possible, the early part of this century witnessed their final extinction.

Cary, the well-known map engraver, published in 1786 his "Survey of the Country Fifteen Miles round London," and in a copy of this Survey which belonged to "J. Cary," containing annotations in his handwriting, and which is now in the possession of one of our hon-secretaries, Mr. B. G. Cole, he described Waltham or Epping Forest (including Hainhault, not then disafforested) as comprising about 60,000 acres, of which 12,000 acres were unenclosed woods. Hainhault Forest then contained about 3,000 acres, the soil whereof belonged to the King, being formerly part of the possessions of the Abbey of Barking. He adds, "The Crown has an unlimited right to keep deer in these forests, of which there is a stock of both red and fallow deer."

In the above-mentioned annotated copy of Cary's Survey[21] I find the following interesting note, also in the author's own handwriting:—

"1827. Oct. 20.—I met the staghounds at Hoghill House, in Hainhault Forest, to unbarbour a stag. After drawing the coverts a short time, a fine old stag was roused, and took a turn round the forest away for Packnall Corner, hence to Dagenham, and was taken at Plaistow." He adds: "Red-deer to be so near the Metropolis in their wild state I consider as a singular circumstance.—J. C."

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[19] Boyd Dawkins, Pop. Sci. Rev., Jan. 1868; Woodward, Geol. Mag., Sept. 1869; Walker, Trans. Essex Field Club, vol. i. p. 38.

[20] See *ante*, page 44, in the notice of Norden's Map of Essex.—Ed.

[21] See note in Proc. Essex Field Club, vol. i. p. xlvi.—Ed.

This entry, in all probability, relates to one of the last red deer killed in this forest, for I have not met with any later allusion to their existence here.[22]

The fallow deer have held their own, in spite of all difficulties, until the present time, and have strangely preserved their ancient character in regard to size and colour. Locally, they are referred to as "the old forest breed," and are comparatively small in size, of a uniformly dark brown colour, and with very attenuated antlers, peculiarities which have no doubt been brought about by continued isolation, without the admixture of any fresh stock for very many generations. It is remarkable that no individuals of the true fallow colour (*i. e.*, yellow dun) or spotted with white, are ever seen in this forest. This in some measure proves the antiquity of the stock, which would otherwise show in their progeny a reversion to one or both of these varieties, which elsewhere are so common. The keepers assert that not only are there no spotted or fallow varieties here, but that they have never observed any spotted fawns, the latter being dark like their parents.[23] If this observation be correct, it is very remarkable, for it is generally supposed that the fawns of all fallow deer (and red deer also) are spotted at birth, and that except in the permanently spotted variety the spots disappear with age.

The attenuation of the antlers is also very noticeable, the palmation of the horn being reduced from a hand's breadth to about the width of two fingers.

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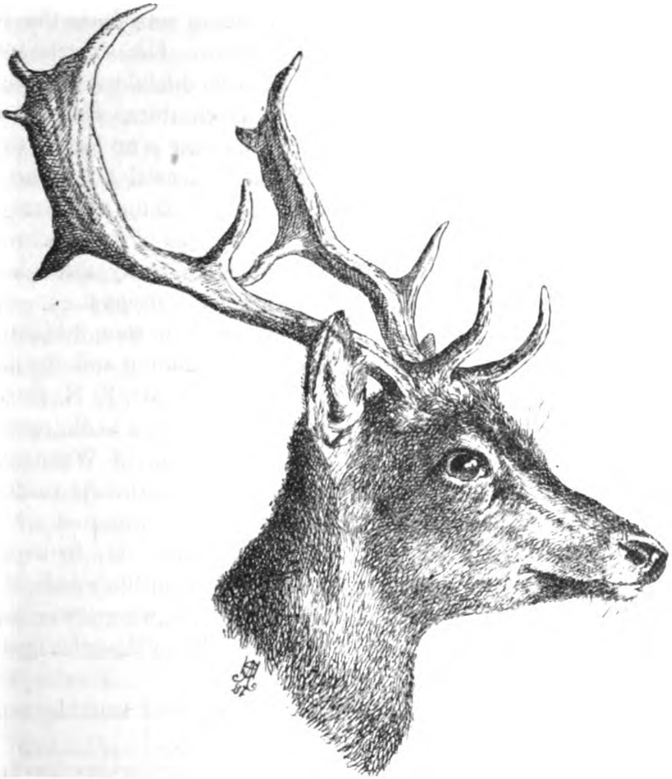
[22] Since these lines were written Her Majesty the Queen has been graciously pleased to send a few red deer to Epping Forest from Windsor Park. We have in our possession the antlers of a red deer which were kindly given to us by Mr. Basham, of the King's Head Inn, Chigwell. They had been attached for many years to one of the outhouses in the garden, and we were told that in all probability they belonged to one of the last red deer killed in the forest. It should be mentioned that the "Verderor's" Court of Attachments of the Royal Forest of Waltham were held "Hospit : vocat : le King's head in Chigwell" from at least the commencement of the 18th century, as appears by the "Rolls" of the Court printed by order of the Epping Forest Commissioners, and therefore it is not unlikely that many such relics would be brought there. Mr. Buxton writes as follows in his "Epping Forest :"—"The lord of the manor of Loughton has some heads of red deer taken from the forest, which have been in the possession of his family for several generations, and which adorned what would certainly be accounted grand stags in Scotland at the present time. This was to be expected, as woodland red deer always attain a larger size. From a statement made in 1871 by a very old inhabitant, and written down from his lips, it appears that the herd was of considerable size within his recollection. 'There was a kennel at Loughton Bridge, kept by a man named Dean, and the dogs and horses for the hunt were kept there. A paddock was enclosed with high palings, and in this enclosure the deer, caught wild in the forest, were kept, and hunted as required, but not killed. The black deer (fallow) were hunted two or three times a week, killed, and used as required also. The method of taking the red deer was by fixing a net (kept at Loughton Bridge for the purpose, and about a mile long) from the milestone in the forest down to Monk Wood. The deer were driven up from Monk Wood into it. Two or three were then selected, and the rest, with the young ones, set at liberty. A cart for the purpose was in readiness, and the deer caught were placed in it and taken to Loughton Bridge, where they were kept in the paddock till wanted.' . . . . . The staghounds came to an end in 1797 [this appears to be an error ; see quotation from Cary's Map in the text of Mr. Harting's paper above], and early in the century the red deer were suffered, from the indifference of the authorities to diminish, and the remainder of the herd were finally caught some twenty years later and transported to Windsor."—Ed.

[23] See Mr. D'Oyley's Observations, Proc. Essex Field Club, vol. ii., p. xxii.—Ed.

There can be no doubt that, from long isolation and continued breeding in and in, the herd has considerably degenerated. So far as I have been able to ascertain, there has been no importation of fresh blood within the memory of three generations of keepers. One man had heard his grandfather say that he remembered, when a boy, two cartloads of deer coming to Epping from Windsor, but nothing more could be ascertained respecting them. At present, the number of fallow deer in Epping Forest is estimated to be about eighty or a



HEAD OF AN EPPING FOREST FALLOW BUCK.
Shot in the Forest by Mr. T. F. Victor Buxton, Sept. 11, 1884. Drawn by H. A. Cole.[34]

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[34] We are indebted to Sir Fowell Buxton's kindness for the loan of the head from which the above drawing was taken. We were assured by one of the keepers that the animal was a full-grown buck over eight years old, with much-developed antlers—indeed, abnormally so, the palmation being far in excess of that commonly observed in the forest deer. The specimen was selected for illustration as being a remarkably fine one, but the breadth of the antlers hardly conveys a correct idea of the average growth of these appendages in our forest breed: in by far the greater number of animals the antlers are much more attenuated.—ED.

hundred head.[25] They do not associate in one herd, but roam about in small parties, keeping to the thickest underwood and most unfrequented parts of the forest. Consequently they are but seldom seen, and many people doubtless are unaware of their existence. With sufficient ground over which to roam, plenty of covert to conceal them, and enough to feed upon, they do well enough, and, it need hardly be said, form a most pleasing feature in the forest landscape.

In February, 1884, an attempt was made to introduce the Roe deer, and so far with every prospect of success. The experiment is an interesting one, and one which naturalists doubtless will regard with curiosity; for, with the exception of Dorsetshire, where it was re-introduced about eighty years ago, the roe deer is no longer to be found in a wild state in any part of England. I need not name the few parks in which a few head of roe are preserved for ornament, for in these their liberty is restrained within the limits of their inclosure. In Dorsetshire they are perfectly wild, and roam freely through the Milton, Whatcombe, and Houghton woods, which fringe the southern side of the vale of Blackmoor, where at the present time it is estimated there may be scattered about perhaps one hundred and fifty head.

Mainly through the exertions and liberality of Mr. E. N. Buxton, one of the verderers of the forest, arrangements were made to transport a few from that district, Mr. Mansell Pleydell, of Whatcombe, and Mr. Hambro, of Milton Abbey, having expressed their readiness to supply them if only they could be caught and transported without injury. It is comparatively easy to take deer with nets in a park; but in this case, the animals being scattered about in the woods, it was not quite so simple a matter. The experiment, however, was made, and, as an eye witness of the *modus operandi*, I may describe how the capture was effected.

The first step was to secure a sufficient length of suitable netting and a deer-cart. For this purpose Mr. Buxton applied to Mr. R. Porter, of Thames Ditton, whose experience in the capture and transport of park deer is well known, and he at once undertook to supply what was needed. The cart and the nets were despatched to Blandford, and on Feb. 13 I repaired to the scene of action. I may here remark that the time of year selected was chosen advisedly. For obvious reasons, it was desirable to wait for the close of the shooting season, and we were anxious at the same time to increase the chances of securing some does in fawn. The afternoon of the first day was spent in riding over the ground, noting the position of the coverts, and making plans for the morrow. The next morning we were up betimes, and, after a drive of some miles to Bully Wood, arrived at the meet, to find the keepers and beaters, about thirty in number, already assembled. A number of poles were cut, six feet in length, and forked at the top like clothes-props. These were driven into the ground at intervals, and the nets, of which we had two hundred yards, were supported on the forks, the lower side being allowed to trail on the ground in the direction of the covert to be driven. No dogs of any kind were used. The beaters merely made a detour, got well away from the nets before entering the wood, and then advanced steadily in line. We posted ourselves near the end of the net, so as to be able to run up and assist in holding any deer that might charge it and become entangled. We had not long to wait; the tapping of the beaters sounded nearer and nearer, and soon the cry was heard, "Deer for'ard." In a few seconds a doe with a last year's fawn broke covert just below the nets, and got away; while a brace of bucks broke on the right, and, in spite of all the efforts of the "stops" to turn them, raced away over the down for Houghton Wood. Almost at the same moment a fine doe, being pressed forward by the beaters, came right into the net, and was rolled up like a rabbit. We soon had her by the hind legs, and, carrying her as carefully as we could, drew the sliding door of the deer-van, and pushed her gently in. In the semi-darkness of the van, shut away from the sight of her pursuers, and comfortably littered down with old hay, she soon became quiet, and we anticipated little risk of injury, so long, at least, as the van was at rest.

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[25] It appears from the Court Rolls of the beginning of last century that, by large presents of venison to high personages, and the privileges of hunting recklessly accorded to Court favourites, the stock of deer in Waltham Forest had become so low, that by an order of the Earl of Tankerville, "Chief Justice and Justice in Eyre of all His Majts'. Forests, Chases, Parks, and Warrens on ye South side of Trent," it was decreed that a "generall restraint of His Majts'. Deer and Game" should continue for three years. No person or persons were to be allowed to hunt, course, shoot, sett, or in any manner of way to kill any deer or game of any kind whatsoever within the said forest during the continuance of this my restraint (except Peers of the Realm goeing to and retorning from Parliamt.), and except alsoe such Deer as shall be given in composition of those who have the liberty of purlieu Hunt and Free Hay's." Poachers also, locally known as "Waltham blacks," had committed great havoc. But after this, according to Buxton's "Epping Forest," the deer again increased, and "our grandfathers describe them as being visible in large herds between Woodford and Epping to the passengers in the numerous coaches which passed that way, bound for the eastern counties. An old inhabitant writes: 'When a boy, my father took me for a treat to London. It was a fine summer morning. We started at four o'clock. I well remember the open plains bordering the forest swarmed with deer. I am sure there must have been hundreds in sight at one time. This was in the year 1829.' Another old inhabitant tells me that he remembers seeing them opposite Assembly Row, near Leytonstone."—ED.

Moving on to the next beat, we drew Park Wood, and in three drives secured a buck and three does, two of the does being taken together, as side by side they dash headlong into the net. Fortunately the weather was most favourable—a fine balmy spring day with a light wind—and the ground dry, a most important thing in our favour; for, had the coverts been wet, the labour of shifting the nets would have been considerably increased. As it was, each net, when gathered up into a long sack like a hop-pocket, required four men to transport it. Had it been wet, its weight would have been doubled. Park Wood hangs against the side of a hill; below it is a deep coombe, and on the opposite side a treeless down, with here and there a rugged mass of flint cropping up through the smooth, short turf. As we gazed upon the wood across the valley, it seemed to hang like a picture against the down. We could see the beaters enter on the left, and move steadily towards the top right-hand corner, where we knew the nets were placed. At intervals, the leaves being off, we could catch a glimpse of the startled roes as they moved furtively amongst the hazels, now dashing onward like hares, now pausing to look back and listen, with their large brown ears thrown forward in sharp profile against the silvery bark of the ash. It was a sight to gladden the eyes of a huntsman. Nothing seemed wanting but the "music," and we almost longed for a cry of hounds to complete our enjoyment of the scene. But hounds on this occasion would have frustrated all our plans. They would have moved the deer too fast, driven them out of the coverts, and we should probably not have caught one. It was the steady advance of a line of beaters that we wanted; now hanging back on the left, now sweeping round on the right, then onwards and upwards, gradually giving the deer the proper direction, until about twenty or thirty yards from the net, when a judicious wave of the hat by a man in ambush would cause a sudden headlong rush, and the next moment a brown struggling mass would be enveloped in the yielding toils. From Park Wood, with four now in the van, we proceeded to Meriden Wood, where several deer broke covert before our preparations were completed. The toils, however, were not laid here in vain, for we took a fine buck with horns in velvet, and a well-grown young doe.

We had now as many as were needed, without having quitted Mr. Pleydell's ground; but, at the invitation of Mr. Hambro, and in the hope of being able to secure a brace for the Zoological Society, in whose gardens the roe deer happened to be unrepresented, we turned towards Milton Abbey, and proceeded to draw the lovely wooded slopes of Delcombe, now moving a pheasant, now flushing a woodcock by the way, while, from time to time, the rabbits seemed to vie with each other in showing the deer the way to the nets. But the latter were not to be taken so easily; it required much care on the part of the beaters not to alarm them too much, and to make them head in the right direction. Sometimes they would decline to be driven, especially if a bit of open ground intervened between the coverts; and, boldly facing the beaters, they would break back to the woods behind them, astonishing us with their wonderful powers of leaping. The bucks seemed much more wary and cautious than the does: the latter often went headlong towards the nets, but the former would stop short, sniff the air, and look about, as if suspecting some hidden danger, and then dash off to the right or left, and escape. Failing to secure another buck, we had to be content with a couple of does for the Zoological Society, three or four others, not wanted, being restored to liberty.

We left off in the evening twelve miles from a railway station, and the deer-van had to travel slowly, to avoid shaking its occupants unduly. Being anxious not to keep them in the van an hour longer than was necessary, I resolved, in company with Mr. Porter, to travel all night with them. We got the deer-van on to a truck at Blandford, and reached Waterloo Station at four o'clock the next morning. No livery stables being opened at so early an hour, there was difficulty in procuring a horse. Necessity, however, as usual, became the mother of invention, and a cab-horse was borrowed at the station, with which we got the deer to Liverpool Street Station, and soon had the van on a Great Eastern truck in time for the first train for Loughton. Here Mr. E. N. Buxton, having been duly apprised by telegraph of our movements, met us with a horse of his own, which took the van safely into the forest; and at half-past nine (in less than twenty-four hours from the time of capturing the first doe) the sliding-door of the van was withdrawn, and the roes were at liberty in another county. They bore the journey uncommonly well, showing no signs of lameness or injury of any kind, as they bounded from the cart, and one by one disappeared from view amongst the underwood. Two were kept back for the Zoological Gardens, where they were safely deposited the same afternoon.[26]

Whatever may be said of the destructive habits of deer, I cannot but think that the naturalists of Essex will rejoice to welcome back within the limits of this forest the timid roe, which years ago existed here, and to reckon once more amongst the larger mammalia of the county the three kinds of deer which I have here attempted to give some account.

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[26] Since these lines were written it is satisfactory to be able to state that the does have dropped fawns, and the little stock of roes has been increased.

By the 4th section of the "Epping Forest Act, 1878," the deer are transferred to the Conservators, to be preserved as objects of ornament in the forest. Long may they remain to delight the eyes of the rambler in these ancient woodlands.

Inula crithmoides, L. (Golden Samphire).—Since handing my "Report on the Flowering Plants growing in the neighbourhood of Colchester" to our Hon. Secretary for publication, I have learnt that the above plant has been found recently on Mersea Island, by Miss M. Gripper; and a few days since, on looking at some plants sent me by Mr. F. Smith, I found a specimen of the plant, which he had collected at St. Osyth. Both these habitats are mentioned in Gibson's "Flora of Essex;" but as it is a somewhat rare species, readers of the ESSEX NATURALIST will sympathize with my pleasure at being able to cross it out of my list of lost plants. The golden samphire, like the marsh samphire, is sometimes confused by tyros with the true samphire, and has occasionally been used for pickling.—J. C. SHENSTONE, Colchester, February, 1887.

Neolithic Celts at Felstead.—It may be of interest to some of the readers of the ESSEX NATURALIST to know that in September, 1886, I found a very good neolithic celt lying on a stubble field about two miles to the north of Felstead. The stone is in exceedingly good preservation, having only two small pieces chipped out from the place where it was evidently hafted. It measures five inches in length and two and a half in width, and is made from a yellowish-grey flint, which has weathered to a light yellowish-brown. It is beautifully polished, and has smooth and flattened edges, the upper edge being much more arched than the lower. The pointed end has evidently been much worn, from use, and it is somewhat remarkable that the wider end has not been fashioned with an edge, so that only the pointed end appears to have been used. Some time ago I found another of a somewhat unusual shape, but this one has not been worked up like the polished one. It measures 4 in. × 2 in., and is not polished. The chipping is very good and sharp, and a cutting edge has been formed at one end, and along one side, by alternate chipping. It is made from a clear black flint, but has evidently not been made for hafting. Part of the weathered surface of the flint has been left on, but all the sharp edges have been chipped away and smoothed down, so that it can be held easily and comfortably in the hand.—Rev. A. W. ROWE, M.A., F.G.S., Felstead, 4th Feb., 1887.

Silene Otites, Sm. in Essex.—In the "Journal of Botany" for February (vol. xxv., p. 56) Mr. William Whitwell writes as follows:—"In 'Jour. Bot.,' 1880, p. 344, Mr. R. A. Pryor reported his discovery of this species on the Roman wall at Colchester, 'in a somewhat exposed situation to the north of the town, by the foothpath to the river.' This was the first notice of its occurrence in Essex. On September 15th, 1886, I found several specimens of the plants growing on the top of the walls of Colchester Castle. This locality is about half a mile distant from Mr. Pryor's, and the ruins of the Roman wall do not extend far from his point in the direction of the Castle. The Castle may therefore, I think, be accounted a wholly independent station; though, of course, the same causes, natural or otherwise, which occasioned the appearance of the species in the one spot will also account for it in the other. The plants were six or eight in number, dwarfed as to height (4 to 6 in.), each plant much tufted, with the perennial stock thick, and almost woody—very different in appearance from tall (18 to 21 in.) and graceful specimens kindly given me by Mr. Herbert Goss, F.L.S., and gathered by him on roadsides at Tuddenham St. Mary, Suffolk. My find throws no light on the inquiry whether or not *Silene otites* is native to Essex. It is an interesting question whether at Colchester the plant extends along the whole of the remains of the Roman wall, and to the other ruins in that old town; also, further, whether it is to be found in less apparently artificial situations than upon ancient walls. On these points I have not yet succeeded in obtaining information; but I hope to be more fortunate during the present year." We shall be glad to have Mr. Shenstone's remarks on the above.—ED. E.N.

THE ESSEX FIELD CLUB.

ORDINARY MEETING, Saturday, February 26th, 1887.

[Commencing with the present meeting, reports of the meetings of the Club will be printed from month to month in the ESSEX NATURALIST, and, *when practicable*, in the number belonging to the month immediately following that in which the meetings were held—*e. g.*, March meetings will be reported in the April number, and so on. Papers and longer notes will not usually be printed in this place, but will in most cases be given under separate headings in the ESSEX NATURALIST, and, as soon as arrears in hand are somewhat cleared off, the Editor will make strenuous endeavours to print papers, etc., within a few months of the date of their delivery. Reports of the meetings still unpublished, including the Annual Reports of the Council for 1885 and 1886, will be printed in part 2 of vol. iv. of the "Proceedings," which is now being prepared for the press, and which will complete the old series of the "Proceedings."—ED.]

The Seventy-fifth Ordinary Meeting was held at the Public Hall, Loughton, at 7 o'clock; Mr. T. V. Holmes, President, in the chair.

In addition to the usual contributions to the Library, two large lithographed portraits of the late Mr. Edward Doubleday were presented by Mr. H. B. Woodward.

Mr. H. C. Snell was elected a member of the Club.

Mr. Holmes returned thanks for his election as President, and nominated the following as Vice-Presidents of the Club during his year of office:—Mr. E. N. Buxton, J.P., etc.; Mr. E. A. Fitch, F.L.S.; Mr. H. Laver, M.R.C.S., F.L.S.; and the Right Hon. Lord Rayleigh, F.R.S.

The Secretary announced that he had been requested to draw up a list of the pre-historic remains in Essex for the Pre-historic Remains Committee of the British Association. This list would be preliminary to the more detailed catalogue which it was the intention of the Club to prepare. The Secretary asked for the active aid of members in the compilation of the list. Help was more especially desired from those able and willing to make personal visits of inspection to the less known or reputed earthworks, and report upon their present condition. Also extracts from books or periodicals giving details of, or references to, any pre-historic remains in Essex, and records of the discovery of flint or bronze implements, pottery, etc., in any part of the county. The Secretary stated that it was only by such help that he would be able to draw up a fairly accurate and complete list in the short time allowed for its preparation.

A living specimen of the Dormouse (*Myoxus avellanarius*), found in its snug winter nest of grass at Buckhurst Hill that afternoon, was exhibited by Mr. H. A. Cole. The animal appears to be not at all uncommon in the forest.

A short note on some flint implements found near Felstead was communicated by Rev. A. W. Rowe, M.A., F.G.S. (See page 62.)

Mr. J. E. Harting, F.L.S., read a paper on "Wild-fowl Decoys in Essex," illustrated with coloured diagrams drawn by himself. Several questions were asked at the conclusion of the paper by the President, Mr. White, Mr. Gould, Mr. Bros, and others, and were fully answered by Mr. Harting. The paper itself, with any information thus elicited, will be printed in an early number of the ESSEX NATURALIST.[1]

A hearty vote of thanks was accorded to the author, and the meeting ended; tea and coffee being served as usual to the members and visitors.

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[1] We think our readers will agree with us that it would be useless giving any discussion on a paper until it is printed. We therefore propose in future to give any useful remarks made at the reading of a paper immediately following the paper itself.—ED.

THE PAST AND FUTURE OF THE ESSEX FIELD CLUB.

By T. V. HOLMES, F.G.S., M.A.I.

(Being the Presidential Address, delivered January 29th, 1887.)

SEVEN years have now passed since the delivery of the Inaugural Address by Professor Meldola, which afterwards became our first publication. When this address was spoken, the Club was scarcely two months old, though it already numbered more than 140 original members. Since then it has steadily advanced; increasing numbers have enabled us to devote more money to the publication of Transactions and Proceedings, and the existence of money for printing purposes has largely tended to produce a satisfactory supply of local and original papers. As, nevertheless, an age of seven years or thereabouts is usually a critical period in the history of societies like ours, I do not think I can occupy your time more usefully this evening than in a review of our past work, and of the means of ensuring a prosperous future.

It is noticeable in the histories of societies having objects more or less like those of our own, that a good number of members to start with, and satisfactory progress during the first few years, by no means necessarily imply a certainty of continuous advance. As an illustration of the difficulties that may impede the growth of a society started to supply a real want, I will take the case of the Geologists' Association, to which many of us belong, and in conjunction with whose members we have made more than one excursion. Its first ordinary meeting[1] took place on January 11th, 1859, and it was then stated by the president that within six weeks after the first conference, 150 gentlemen, including many well-known geologists, had applied for membership—a number nearly identical with that of the members of the Essex Field Club at the date of Professor Meldola's Inaugural Address. During the year 1859, 164 persons became members of the Association; in 1860, thirty-one joined; in 1861, fifty-seven were added; and in 1862, as many as sixty. Thus at the beginning of 1863, four years after the first ordinary meeting, the prosperity of the Association seemed assured. But only sixteen members were elected during 1863, and during the eight years 1863-70 (both inclusive), the average number was only ten. In 1871, the Association made a fresh start as regards members, showing that the cause of the previous stagnation was not the exhaustion of the source of supply. For in 1871, fifty-nine new members were enrolled, and the average during the years 1871-80 (both inclusive), was nearly forty-seven. One result of the stagnant state of the Association in 1863, and a cause of its continuance after that date, was the non-printing of any proceedings, from January, 1865, to February, 1870. The part recording the doings of session 1859-60 consisted of sixty-four pages, that for the next year of fifty-one pages. The session of '61-2, and its work, was chronicled in two parts of "Proceedings," amounting together to 128 pages. But in the three years '62-5, one part only was issued each year, with an average number of fifty-seven pages in each part. At present the Geologists' Association publishes four parts per annum, having a total of about 250 pages, and numbers about 500 members.

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[1] I take the following facts from the Presidential Address of Professor T. Rupert Jones, delivered November 5th, 1880. Proc. Geol. Assoc. Vol. VII. No. 1.

But what interests us on this occasion is not its present prosperity, but the singular stagnation of the Association after it had been progressing satisfactorily during the first four years of its existence. Professor Rupert Jones remarks, that "aiming at extreme economy, the authorities had not attained the good result of satisfying the expectations of subscribing members in town and country." With a new and bolder policy the Association permanently revived, the Proceedings were issued free to members four times a year, and monthly circulars were regularly supplied. And since 1871 the career of the Geologists' Association has been one of uninterrupted progress and growing prestige.

The progress of the Essex Field Club during the past seven years has certainly not been impeded by the lack of enterprise that threatened to check the growth of the Geologists' Association at a similar age, if not to lead to its ultimate extinction. Our "Transactions" and "Proceedings" in the first year of our existence, 1880, reached a total of 154 pages, and the average number of pages per annum issued from the beginning of 1880 to the end of 1886, has been about 200, exclusive of plates, but including the "Special Memoir" on the Earthquake. It is much to be regretted that the sale of this "Special Memoir" has not been commensurate with its scientific merits, which have caused its appearance to be welcomed as an admirable example of the kind of work which it is one of the best functions of a powerful local society to accomplish. For the future we have learned that our most prudent course will be to publish special memoirs only after obtaining a list of subscribers sufficient, at least, to cover the cost of production. But though the non-success—in a pecuniary point of view—of the Report on the Essex Earthquake has combined with a much more powerful influence, the non-payment of subscriptions, to retard the issue of our ordinary "Transactions" and "Proceedings," yet by means of a special effort on the part of some of the more zealous members, our publications are now, if not brought quite up to date, yet by no means so far behind as to imperil our future prospects. For no scientific society that allows its publications to fall behind, can expect to maintain a high reputation, authors being unanimous in preferring the speedy printing of their productions. And the more valuable the paper, the less likely is it to be sent to a society backward in this respect, its author being certain of more favourable conditions elsewhere.

Our new mode of publication, that of a monthly journal, will, I trust, be found an advantage in many ways. It is certainly much better adapted than a yearly part to keep alive and active the interest of our members, many of whom will now feel that short notes hitherto sent to Essex newspapers would have a better chance of permanent preservation in the pages of the ESSEX NATURALIST. Such notes would hardly have been forwarded by our most devoted members for an annual part, their speedy publication being in many cases absolutely essential, if they are to have any practical value. And we, doubtless, have many members who, not caring to attempt elaborate papers, would have pleasure in sending notes on the appearance, locally, of some rare animal or plant, the nature of some new geological section, the proposed exploration or destruction of some ancient earthwork, or the discovery of some remarkable prehistoric or fossil remains. Indeed, apart from personal observations, our editor will be very glad to receive extracts and cuttings from any books or newspapers, bearing upon the subjects in which this Field Club is interested. On the other hand, I do not think any serious difficulty is likely to arise from the combination of the "Transactions" and "Proceedings" in the same Journal. Few of our papers ever exceed more than forty printed pages, and it is obvious that one of that length, if printed, partly in a number of thirty-two pages, and partly in one of twenty-four pages, would still leave sixteen pages for other matter, and if so placed as to occupy the latter part of the earlier number, and the first pages of its successor, would appear as a continuous whole when the numbers were bound. Indeed, the chief drawback consists in the much increased labour devolving on our Secretary and Editor, Mr. W. Cole, in the preparation of twelve monthly parts instead of a single yearly one. And there are various circumstances that oblige me to dwell for some moments on this point and others connected with it.

All who know anything of the working of societies like ours, are aware that their prosperity depends very much more on the personal qualities of the secretary than on those of all the other officials put together. It is needless to point out how much this society owes to its secretary and founder, Mr. W. Cole, or how desirable it is that we should do our utmost to retain his services. But the labours of a secretary tend to grow in proportion as the society to which he belongs flourishes, and in our own case, Mr. Cole has found his work in connection with the Field Club increasing, while, on the other hand, the time at his disposal for attending to our affairs, has very much diminished. Having, through his energy and willingness to work, gradually assumed the character of general servant, he has for some time found himself almost overburdened by the various duties thrust upon him in addition to those properly his own. It therefore becomes absolutely necessary for me to take this opportunity of urging our most active and zealous members to endeavour to relieve our secretary of some portion of his load before it becomes unbearable.

Much has been done during the past seven years towards the formation of a museum and library, but we are still as far from "having in one building our collections, library and meeting room," as we were at the date of Professor Meldola's address. Delay in this matter, however, has not been dangerous. We have developed during the interval from the *Epping Forest* into the *Essex* Field Club; and it would have been extremely rash to have fixed upon a permanent habitation before we had thoroughly ascertained what locality would best suit the great majority of our members. In the case of a Norfolk society, Norwich would be unanimously chosen as the only suitable head-quarters. But in the case of Essex, to consider the respective claims of Chelmsford and Colchester, and to ignore the populous districts near London, would be as though a Northumberland society should put aside Newcastle-on-Tyne, and discuss the merits of the more central towns of Alnwick and Rothbury. A glance at the latest list of our members shows that while a large majority of them come from the Epping Forest district, a much larger number live outside the county than in other parts of Essex. Were our meeting place changed to Stratford, Romford, Brentwood, or elsewhere on the main line, our Epping Forest members would lose, and our members from other counties would not gain, as regards ease of access, while many would feel that an unattractive spot had been preferred to the pleasantest region of Essex. It is certainly singular that we have at present so few members from the district between Stratford and Brentwood, for a society occupying itself with the objects of interest in Essex must necessarily have special attractions for the inhabitants of that county, whether they are able to attend its meetings or only to read its "Transactions." From the remoter parts of Essex our members, though few in numbers, are of high average as regards quality. Everything seems to me to point to the neighbourhood of our present headquarters as the fittest for our permanent habitation. And when the prolongation of the Epping and Ongar Railway to Chelmsford shall be accomplished, we shall gain the additional advantage of easy access to the remoter parts of Essex from the Epping Forest district, the want of which now constitutes its sole defect.

But in addition to hesitation as to locality, another reason obliging the postponement of schemes for providing permanent headquarters has hitherto been the want of a sufficient body of members whose subscriptions could be relied upon for their maintenance. All young scientific societies contain many members who, though an addition to the bulk of an association, do not increase its strength. After a year's membership they frequently leave their subscriptions unpaid, and put aside, unnoticed, applications from the treasurer, though they do not return the circulars and publications sent in reliance on their subscriptions. In our own case the number of non-paying members has hitherto been so great that but for the special effort already mentioned, the "Transactions" just issued could not have been published at all. Now it is of the utmost importance to the governing body of the Field Club to know upon what sum they can depend. And it must be remembered that it is impossible for them, in the case of a young society like ours, to estimate beforehand what proportion the paying members will bear to the "bogus" variety, or, consequently, what expenditure they are justified in incurring for the development of the Field Club and the furtherance of its aims.

On the other hand, I think no similar society, at our age, can point to a larger number of acts of zeal and liberality on the part of its members, both ordinary and honorary, than can ours. Nor can any local scientific association show, in the same period, a greater amount of energy successfully applied to the elucidation of the natural history and prehistoric archæology of its district. In addition to our scientific labours we may also look back with satisfaction on the part played by our Field Club in preventing the injury that would have been wrought to Epping Forest by a certain railway of which we now happily hear no more. Indeed, it seems to me that in nothing can our society be more usefully employed, apart from its scientific work, than in doing its utmost to check not only the execution of ill-advised railways, but of all projects for stopping footpaths or enclosing commons in the county of Essex. I trust that our members, wherever they may reside, will do their best to obtain information about such schemes, and at once send it to our secretary, so that the influence of this Field Club, together with those of the Commons and Footpaths' Preservation Societies, may be brought to bear before it is too late. On the other side of the question, though little or nothing can be urged on behalf of the common-grabbers, there is often some excuse, though not an adequate one, for those who long to close up footpaths. I think that, as a very general rule, farmers would seldom object to the presence of people like ourselves in their fields for the purpose of collecting plants, insects, etc., could they be sure that, though otherwise evidently harmless, we would carefully abstain from damaging fences and leaving gates open or insecurely fastened. During many years' experience on the Geological Survey in Yorkshire and Cumberland, I never once, when wandering freely over the fields, met with either objection or incivility from a farmer, or even with excessive curiosity as to what I was about. Nor have I any complaint to make of that much more suspicious class of men, gamekeepers. Therefore I trust that our members, while in pursuit of their prey, will be careful to give no excuse to owners and occupiers of land to desire their absence, and consequently to attempt to diminish their rights.

Turning to our purely scientific interests and work, I have, in the first place, to congratulate all those interested in the geology, botany and zoology of Essex, on the publication of the whole of the drift maps of the county by the Geological Survey. Rather more than a year ago I pointed out the special advantages of drift maps in Norfolk, Suffolk and Essex, and the comparative uselessness of maps of those counties which ignored the superficial beds, whatever might be the case elsewhere. Therefore I need only say now that the drift maps of Essex should be in the hands of all who are interested in its agriculture, underground water supply, and the distribution of its animals and plants, as well as in its geological structure. And by the geologist the survey maps should be looked upon rather as a sound basis for further work than as obviating any need for his labours. Any geological map must vary in completeness as the amount of evidence at the disposal of the surveyor varies. In Essex the general geological structure of the county is very simple, but the accurate mapping of the various beds in detail is often a task of some difficulty, both from their uniformly soft character and their variability. But geological maps *must* be coloured, and each formation limited by boundary lines, whatever may be the amount of available evidence. Insufficient evidence, too, may not only cause the existence of inaccurate boundary lines, but of erroneous notions as to the relation of the beds to each other. Thus, the sections seen by the geological surveyor may not have led him to suspect the existence of an unconformity between two beds, while a section exposed years after his departure may make it at once manifest. In some instances he may have been guided by evidence no longer available, but, on the other hand, it must necessarily have happened that since his departure new wells have been sunk, new brick yards and gravel pits opened, and new railways and road-cuttings made. This new evidence may turn out to be important or unimportant, but it is, at all events, most desirable that our geological members should not omit to notice and record its true nature.

The geological papers that have hitherto appeared in our "Transactions," though not numerous, have been useful additions to our knowledge. The most important as regards the amount of information it affords is that by Mr. W. Whitaker, on "Some Essex Wells," which I trust may be but the first of a series. I have pleasure in adding that my friend and former colleague has lately been making an exhaustive bibliographical list of books and papers bearing more or less on the geology of Essex, which will shortly appear in the ESSEX NATURALIST. Of the merits of our special memoir on the Essex Earthquake, by Prof. Meldola and Mr. W. White, I need say nothing here.

As our botanical largely outnumber our geological members, we find, as might be expected, that our botanical papers and notes decidedly outnumber the geological. Among the more important are the paper by Messrs. Cooke and English on "The Hymenomycetal Fungi of Epping Forest;" that by the Rev. J. M. Crombie on its "Lichen Flora, and the Causes Affecting its Recent Diminution;" also the paper by Mr. R. M. Christy on "The Genus Primula." We may also congratulate ourselves on the more general papers by Prof. Boulger, treating of "The Origin and Distribution of the British Flora," and of "The Influence of Man on the Flora of Essex." Mr. E. M. Holmes and Mr. J. C. Shenstone have favoured us from time to time with much valuable botanical information, and our annual Fungus Forays have been made both more instructive and attractive by the papers of Dr. Cooke, Mr. H. T. Wharton, and Mr. Worthington Smith. The names of many other botanists who have done us good service in various ways will suggest themselves, but it is beyond my purpose to do more than remind you of some of our chief workers in this and other departments.

Our entomological members are at least as numerous as the botanical, and our Transactions and Proceedings abound in useful papers and notes on the insects of Essex. Of these the one most worthy of note is the excellent and admirably illustrated paper on "The Galls of Essex," by Mr. E. A. Fitch. "The Mollusca of the District around Colchester," and "The Mammalia of Essex" have formed the subjects of two valuable papers by Mr. H. Laver; while "The Ancient Fauna of Essex" have been described to us by that eminent naturalist, Dr. Henry Woodward. We have in various ways been much indebted to Mr. A. R. Wallace and Mr. Harting; and only those who have carefully looked through our "Proceedings" can be aware of the large number of shorter notes on Essex animals to be found in them.

In prehistoric archæology, our chief work has consisted of the explorations of Ambresbury Banks and Loughton Camp, and of the laborious but unfinished examination of the deneholes of Hangman's Wood. Our labours in this department testify even more than our other work to the energy and zeal with which our Club has been carried on. And nothing can be more satisfactory than the accounts in our Transactions of our excavations at the two camps, drawn up by Lieut.-Gen. Pitt Rivers, in the case of Ambresbury Banks, and by Mr. W. Cole, in that of Loughton Camp, and admirably illustrated by Mr. W. D'Oyley.[1] A Report on the work done at Hangman's Wood was read before the Field Club two years ago, but has not been published in consequence of the incompleteness of our labours. Fortunately what has been done remains, from its position, just as we left it, unharmed either by man or the weather. And I trust we may be able to bring our exploration to at least a provisional termination in the spring. It may, perhaps, be asked whether the Report already read could not have been printed, as its publication might have served to arouse or keep alive the interest of the Club in the investigation. Against this course, however, the following objection seems conclusive :—

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[1] A glance since writing this Address at No. 1 of the ESSEX NATURALIST shows me that we are indebted to Mr. F. C. J. Spurrell for a carefully drawn plan of a third Essex Camp—that at Witham.

I made a ground plan showing the relations of the various deneholes to each other as carefully as I could, feeling, however, that owing to the amount of debris in each pit, to their want of perfect symmetry, and to the impossibility of knowing accurately the position of the centre of the shaft in closed pits, the accumulation of small errors might lead to a more and more serious want of accuracy as the work went on. It was only towards the end of our labours that we entered a denehole which, from the comparatively small amount of rubbish in it, seemed suitable for sifting operations, it being obvious that testimony to age can only be met with close to the original floor. But it is also obvious that the pit in which sifting is going on should have two entrances, both in case accident should close one of them, and in order to allow of the current of air through, which is necessary to efficient labour. Now the very first operation to be done on resuming our exploration must be the making of a short tunnel from a pit entered at an early period of our work into that in which we propose to sift. Should the length and direction of this tunnel be approximately that which the ground plan gives us reason to expect, we shall have not only a second entrance into the pit to be sifted, but a confirmation, or the reverse, of the practical accuracy of the ground plan which is at present wanting. And without a ground plan the Report would be neither interesting nor intelligible.

Among the papers we have printed in the department of prehistoric archæology, I cannot but mention that by Mr. Worthington Smith on "Primæval Man in the Valley of the Lea."

It is thus evident that, considering the brevity of our past existence, much good work has been done and recorded in our "Transactions," in Essex Geology, Botany, Zoology, and Prehistoric Archæology. But this brief sketch of what has been done only makes the vastness

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All contributions, books for review, &c., &c., should be sent to the EDITOR, MR. W. COLE, 7, KNIGHTON VILLAS, BUCKHURST HILL, ESSEX.

Papers, notes, memoranda, &c., relating to the Natural History, Geology, and Pre-historic Archæology of Essex, will always be welcomed.

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Forthcoming Meeting of the Essex Field Club.

◆

THE SEVENTY-SIXTH ORDINARY MEETING of the Club will take place at the PUBLIC HALL, LOUGHTON, ESSEX, on SATURDAY EVENING, MARCH 26th, 1887, at Seven o'clock.

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At the above meeting the following stand for election in accordance with the new rules :—

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REV. F. H. MANLEY, M.A., Felstead, Essex.

WILLIAM COLE,
Buckhurst Hill, Essex. *Hon. Secretary.*

New Members.—The beginning of the year is the most suitable time for joining the Club. The Secretary will gladly send full particulars, including a statement of the work, publications and privileges of the Club, with forms of proposal, &c., to anyone willing to aid the Society by increasing its roll of members.

N.B.*—*The attention of Members is directed to several important notices on page 3 of the Wrapper, particularly the reduction in the price of the "Report on the East Anglian Earthquake," which will now be sent post-free from head-quarters at 3s. 6d. per copy.

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OF THE

ESSEX FIELD CLUB.

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Honorary Secretary.

Contents:

PAGE

The Past and Future of the Essex Field Club—By T. V. Holmes, F.G.S., M.A.I. (*being Presidential Address, delivered January 29th*, 1887.) (*Conclusion*) 73

Note.—Notes on Boulders and Pits with Roman (?) Deposits, near Roxwell, Essex—R. W. Christy 82

"**Primæval Man in the Valley of the Lea**" (*with seventeen illustrations*)—By Worthington G. Smith, F.L.S., M.A.I., etc. 83

Notes.—Otter at Wakes Colne, from "Essex County Chronicle."—Gravel Pits and Ancient Pottery, near Chelemsford—H. Corder; Food of Pre-historic Man, from "British Medical Journal;" *Cleptes nitidula, Latr.* (*Chrysididæ*) at Benfleet; Lopping and Topping; A Colony of Bats, from "E. Essex and Halstead Times" 92

Report of Ordinary Meeting, Essex Field Club, March 26th, 1887 94

Notes.—*Silene Otites* in Essex—W. H. Harwood; The Lexden Subsidence—T. V. Holmes, F.G.S. 95

The "Salting Mounds" of Essex—By H. Stopes, F.G.S. (*Commencement*) 96

The authors only are responsible for the statements and opinions contained in their respective Papers.

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of the work yet undone the more manifest. It is evident, however, that enough has been done to justify our assumption of the title of the Essex Field Club, and to encourage us to further labours in this interesting but little known county. The nature and amount of the work before us in Geology, Botany and Zoology, is at once obvious to those of our members who are interested in any branch of those subjects. But, compared with the various fields of research just mentioned, prehistoric archæology forms but an ill-defined department. Passing, therefore, from the geology, botany and zoology of this county without further remark, I propose to dwell at more length on various points connected with prehistoric monuments.

It seems to me that in the class of prehistoric monuments should be included, as regards our explorations at least, all such as, unlike mediæval castles and churches, do not show their age in the outward details of their construction, and whose origin is not clearly settled by satisfactory documentary evidence. In short, for our purposes, we should, I think, include works of doubtful age as well as unquestionably prehistoric remains. And if asked whether I think the camp at Witham—to take an extreme case—is satisfactorily established by the Saxon Chronicle as the work of King Edward the Elder, I can only reply in the negative. It is true that under the year 913 we read in the Saxon Chronicle that King Edward encamped at Maldon while the fortress at Witham was wrought. But the passage seems to me to leave wholly unsettled the question whether the earthwork dates from his time, or whether King Edward simply deepened the fosse and renewed the palisades of an older fort. In an immense number of instances the same site has commended itself as a naturally advantageous position to successive races, and this is more likely to have been frequently the case in the eastern counties than in most other parts of England, from the fewness there of naturally strong positions. As a few examples, out of many that might be given, of military sites used by prehistoric and by later peoples in these counties, I may mention those of Castle Rising and Norwich Castle in Norfolk, Clare and Bungay Castles in Suffolk, and Castle Hedingham in Essex. Again, earthworks in the sands and gravels of Essex would suffer much more from neglect than similar constructions on the harder and more coherent chalk, and would need more extensive renovation after long disuse. The above considerations seem to me amply to justify my doubt as to whether King Edward was the builder or simply the restorer of the able to supply the key to some of the cyphers of our half-revealed past history. At any rate, it appears highly probable that they are of great antiquity. They have certainly been in existence for many centuries.

The mounds exist only in the peculiar position described. I have examined very many, but never saw one more than five feet above high-water mark; and although I have spent many days along the coast, and upon the marshes, I never saw or heard of one reaching to low-water mark. They all seem singularly uniform in character and composition. The majority of those I have seen are from two to four and a half feet in depth, and have the same appearance at the surface as when worked down to the base, with the exception, of course, of the differences made upon the surface by vegetation, and, in many cases, by centuries of cultivation. I have not yet examined them sufficiently to tell their full number and extent; but among those I have dug into, the largest was, as nearly as I could judge, about thirty acres in area. The majority are smaller, but nearly all are still of considerable size, ranging from half an acre to five acres or more. The small ones are generally those most accessible for removal; and as the neighbouring fields of stiff clay are improved by the admixture of porous material from the mounds, they have been dug away for this purpose to a large extent. Even the largest consists almost entirely of the red burnt clay, and contains an enormous number of fragments of pottery, bricks, and vessels, although not one of these seems by any chance to be entire, and very few are sufficiently perfect to indicate the capacity, or even the shape, of the vessel or article to which they formerly belonged.

An old man who has lived all his life in the neighbourhood, and has, for many years, been in the habit of carting away earth from a mound, or "Red Hill," as he called it, told me that he had moved many hundreds of loads, but had never found a single piece of whole pottery, or a coin. He sometimes saw flints, but had not sufficient knowledge to distinguish between a worked or chipped flint and another; nor could he be taught to see the difference, even with the strong inducement offered him of unlimited beer and five shillings apiece for all he found. I showed him the largest piece of pottery I had picked up, and he said it was much larger than most pieces, though he recollected having come across a few pieces larger—perhaps nearly as large again.

Mixed with the earth in this and all the other mounds are large quantities of charcoal and wood ashes, though occurring very irregularly; but I found no trace of coal in any shape or form. Clinkers in some places, were not only common, but almost abundant, and showed that great heat must have been thrown out by the fires that burnt them.

In only one instance have I heard of or seen a natural cross-section of any mound, and the position of this happens to be more readily accessible than any other that I know of. It is quite close to the high road from Colchester to Mersea, there consisting of a raised causeway, called the Strood, crossing the creek mentioned above as connecting the Colne and Blackwater. This mound is about five feet thick, and is intersected by a small creek much haunted by crabs. Of the little pottery it yielded, two pieces were Roman turned ware, the only occurrence of such pottery in my researches. There was also much cellular semi-vitrified earth and burnt clay, with impressions of the sea-grass, *Enteromorpha compressa.* This mound has also its upper surface left in a series of narrow stetches, giving evidence of cultivation during Saxon times, when that form of tillage was (I have understood) usually followed.

Mr. H. Laver, F.L.S., of Colchester, tells me that another mound, at Tollesbury, which I have not yet seen, was also tilled during this period, and, having been apparently abandoned to the sea, it remains outside the sea-wall, still retaining the characteristic narrow stetches.

I have no idea of the total number of these mounds in Britain, or even in Essex, but it must be considerable, when, after centuries of destruction, eighteen still remain between Virley and the Strood, a distance of only six miles. I am told that they exist in Kent, along the wide rivers of Suffolk, on the Norfolk coast, in Lincolnshire, Yorkshire, and Durham. Still, I suppose we have them in the greatest number and of the largest size in Essex, which is a matter of some importance if their complete and thorough investigation should ever be undertaken by any scientific society or individual. It is somewhat curious that they should be quite peculiar to our own coasts, and they are entirely different from the "kitchen-middens" of Denmark and Scotland.

Another curious fact in connection with these mounds is that they invariably extend quite down to the London clay, which clearly shows that the clay, at the time they were formed, was not covered by alluvium, or that the men who made them always cleared the site first down to the clay. When we remember the acreage they cover this would be no slight task, and it adds to the difficulty in accounting for them, for if they are only the sites of *salinæ* the object of excavation where no foundation was wanted is a little obscure in these days.

A point worthy of notice is the existence of these mounds far up freshwater rivers, where the water is never more than brackish and often fresh, by no means the position suitable for *salinæ* in ordinary circumstances; and the absence of mounds on the open seaboard is singular.

It is very difficult to determine the original outline of the mounds. One in Mersea is fairly circular, with a diameter of about ninety yards, and several give indications of having been round, but as so many have been partially carried away for agricultural purposes it is of course quite possible that the original outline is in no case preserved.

There can be, I assume, little doubt about the antiquity of these mounds: the chief questions are as to their origin and precise age. Two of them at least were *cultivated* during the Heptarchy, and possibly many others. One has yielded traces of Roman pottery, and upon another I picked up a worked flint scraper.

I have tried for some years to collect traditions and popular opinions about these mounds, and they vary greatly, as one would expect, nor do they throw much, if any, light upon the subject. Some say that they were Saxon or Danish potteries; others, that they were Roman brickyards. Others again maintain that they indicate camp-sites of Boadicea, Queen of the Iceni, who was so cruelly defeated not far off, or of Alfred the Great when stationed there to resist the Danes; while others assert that the Danes brought their dead to be buried there, and that the broken pottery consists of the shattered vessels of the departed heroes. All these fancies are equally unsatisfactory.

In the catalogue of the glass at the South Kensington Museum is the following notice: "In 1295, English records speak of the glass-painters being among the chief tradesmen, particularly at Colchester, where the sand is of a suitable kind, and the salt marshes would furnish an abundance of plants whose ashes yield the necessary alkalies." I quote this instance of an extensive industry going on in the marshes long ago, but I hardly think it has anything to do with the formation of the mounds, as they give many indications of being much older; yet perhaps it is a fact not altogether to be lost sight of.

Two suggestions as to the origin of the mounds have been made to me. One by Mr. Dalton, F.G.S., that they were camp-sites when the surrounding country was densely covered with forest, except the belt between normal high water and the storm range of spring tides. The other by the Rev. J. C. Atkinson, of Danby-near-Zarm, who regards them as being the relics of numerous salt works, similar mounds having been proved by him and Canon Greenwell to have been the sites of old salt works at Redcar and Coatham in Yorkshire. Mr. Atkinson has seen both series and maintains their identity. His paper is published in the "Archæological Journal," vol. 37 (1880), pages 196 to 199, and is entitled "Some Further Notes on the Salting Mounds of Essex."

I am not, however, prepared to accept unreservedly this view of Mr. Atkinson's. Like many other theories it must be taken with a grain of salt, or, indeed, as many grains as a whole summer's evaporation would yield in the position in which some of these supposed salt works were placed if the rivers then were as fresh as at the present time.

At any rate the rude character of the associated pottery, the absence of any trace of metal, and the downward extension of the calcined masses to the London clay argue a high antiquity, higher than that of the surrounding alluvium, four or five feet in depth, perhaps higher than the change of course of the river, to which I have referred already. Vast changes have taken place in the outline, and perhaps in the drainage system, of Essex within the post-glacial epoch (using that term as including the present age). The occurrence, at Clacton-on-Sea, of lacustrine beds overlaid by estuarine deposits now thirty feet above sea level, and of submerged forests of more recent date than these estuarine beds, points to important oscillations at a date at least posterior to the advent of man in Britain, even if we do not accept the alleged proofs of human workmanship in glacial and pliocene deposits.

On the outer edge of the Bradwell mud flats south of the Blackwater, there are seen after storms the remains of ancient brick buildings, exposed at low water of springtides. The deposition of mud on that coast is slowly advancing the saltings eastward, and in course of time these ruins may be once more within the area of dry land—a distant event, it is true, but one that will be more rapidly brought about if ever the old proposal to bring thither the sewage of London should be carried out. Meanwhile the facts of the existence of the ruins, of their material, and of their present level are of great importance as bearing on the recency of the last submergence, and the question arises whether the "salting mounds" are not of anterior date to that submergence. If they were above high water at first (and the fires seem to prove this) and are now accessible by spring-tides, a sinking of five feet at least is implied. On the other hand there are reasons for supposing that a slow subsidence is in progress at the present time.

I will now describe the few specimens I have in my possession.[1]

I. Underlying London clay with charcoal.

II. Pieces of clinker or fused sand, one nearly equal to coarse glass.

III. A piece of black earthenware of very rough make, which was apparently nearly half grass before burning.

IV. Coarse pottery mostly an inch thick, red externally but black within. Some of the pieces are very full of impressions of grass (*Enteromorpha*) having evidently been held together thereby during the baking. One piece belonged to a vessel at least two feet in diameter. All is of the coarsest hand manufacture, none of the pieces showing a trace of the wheel; in fact, all the pottery is ruder and rougher than the earliest known British urns.

V. Four pieces of wedge-shaped tile or brick. These are of much better make, being of finer material and well burnt, apparently made in a mould. Three of them are of the same colour, red, not blackened in the middle. They are five-eighths of an inch square at the smaller end, but not having seen an entire specimen, or the other end of one, I cannot say what the full size may have been. The largest piece I have seen is two and a-half inches by one and one-eighth inch thick. This piece is not of the same material as the rest, but is made of mixed clay; very like an overburnt yellow stock brick made from London clay with a slight admixture of chalk.

The sites shown by red spots on this map [exhibited] (which consists of sheets 36, 37, 46, and 47 of the new six-inch Ordnance Survey of Essex) were recorded by my friend Mr. W. H. Dalton, when examining that district for the Geological Survey in 1874, and are transferred to this from his one-inch map as correctly as enlargement permits. The red spots on the map shown are not intended to

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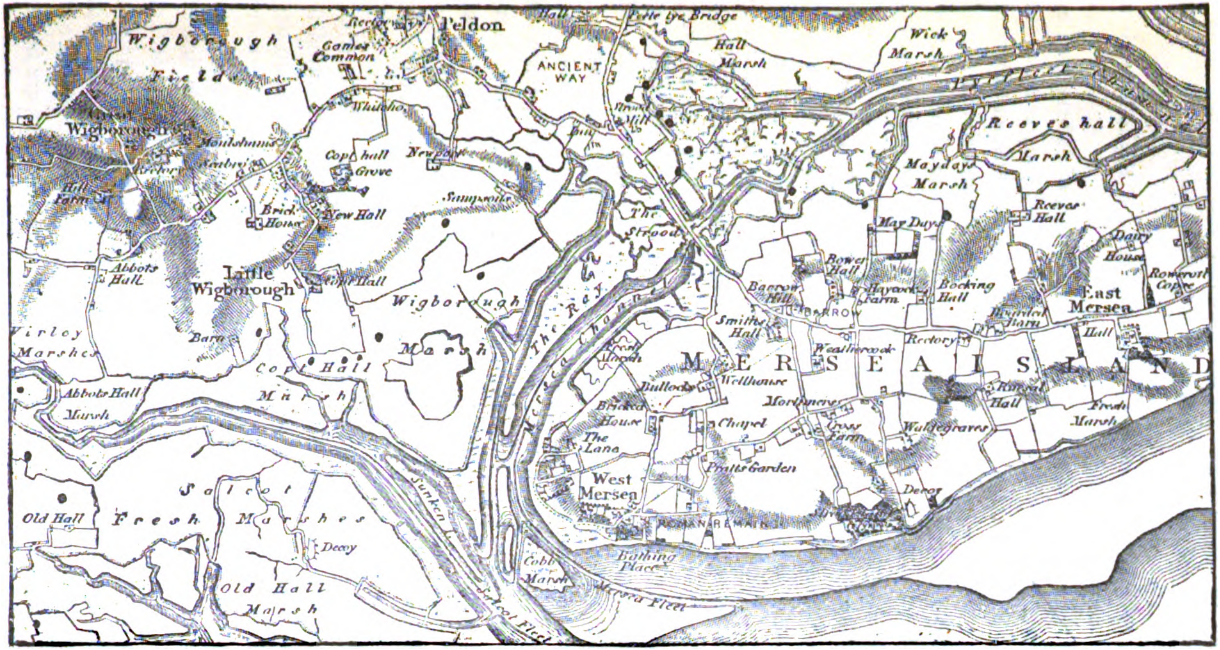
[1] [Mr. Stopes exhibited these specimens when the Paper was read before the Club.—Ed.].



Part of Ordnance Survey Map, sheet 48 S.W. (scale one inch to the mile), showing by means of black dots the sites of some of the "Salting Mounds" in the Wigborough and Mersea districts indicate the relative size of the mounds, only their positions, and there are probably others that have escaped notice.

A brief account of my last pleasant excursion to the mounds may not be uninteresting.

Through the courtesy of Mr. Stacey Gibson, of Saffron Walden, I had permission to visit any of the mounds existing upon his property at Peldon, and on the 7th May, 1879, I started with an experienced *native* navvy, well provided with pick, shovel and sieve to make as thorough research into the facts of the case as time allowed. Arrived at the Brickhouse farm, occupied by Mr. Fairhead, we walked down to the marsh under his direction, and just at the sea wall came upon the first mound. This was nearly level with the wall itself, though a good deal of it has already been carted away on to the land. Commencing to dig we first made a hole about four feet in diameter, and at the depth of five feet came to the bottom of the red earth, which rested on London clay. In this hole we found about twelve pieces of pottery three or four inches square, and two or three hundred over an inch square, together with an immense number of smaller pieces. We also found two bricks, one about three feet down and the other quite at the bottom—in fact, in the London clay. The whole hill had been lowered about two feet for a hundred yards. I had intended cutting a trench through from one side to the other, but as that would have taken several days I preferred digging in various parts of it holes similar to that described. The red earth was of the same depth and character throughout, but I found no more of the wedge-shaped bricks in this mound. Its entire extent was about ten acres, equal to 100,000 tons of earth.

We then tried a mound about a quarter of a mile to the north. Its extent was somewhat indefinite, and though it had been carted from to a large extent, the red earth was still four feet six inches in depth. Rabbits showed their appreciation of its porosity by numerous burrows on the northern face. Here we found a large circular piece of pottery which must have formed part of a pan at least two feet in diameter.

We next proceeded to Sampson's farm, two miles eastward, near the Strood. Here I found two more bricks, but no large pieces of pottery. The greater part of the two mounds which yielded these has been removed in levelling the field, and the greatest depth of red earth left is but thirty inches. The fragments of pottery are not only smaller, but scantier, and there is but little charcoal.

We also visited three or four other mounds near the Strood. The red earth in these was of less depth, and contained less pottery. That near the Strood mill referred to above is an exception in respect of thickness.

I have only to add that if any of the members of the Club wish to investigate these interesting mounds for themselves they will be very welcome to a copy of my maps as a guide to the spots, and any further information that I can give. The map on page 103 is a photographic reproduction of part of the Ordnance Survey, sheet 48 S.W. (scale one inch to the mile), to which have been added dots showing sites of mounds.[1]

That the tale which these mounds can yield to a patient investigator *may* prove entirely unimportant and commonplace I am willing to admit, but possibly some day a more complete and thorough examination than the very imperfect traverses which I have been able to make hitherto, may remove the mystery now shrouding the subject, and I venture to suggest the hope that these mounds may be able to throw some light upon the past of our race. They may have taken the place, in a flat country entirely free from caves, of the natural shelters of rocky districts, and as Colchester may claim the honour, with the flat and despised Essex marshes, of being the cradle, though not the birthplace, of the race which has helped so largely to make England what she is, there may be some hidden and unsuspected revelation concerning that early time, which, when brought to light, may prove of the deepest interest to all the world-wide English-speaking family.

The Otter *(Lutra vulgaris)*.—In addition to the one taken from the Colne, near Wakes Hall (ESSEX NAT. i. 91), I know of six others recorded in the local papers—two from the Colne, three from the Blackwater, and one from the Stour. Doubtless, also many others have escaped record. On last Christmas Eve three were seen on the Chelmer, immediately above Hoe Mill, Woodham Walter; and every year one or more pairs breed in the floodgate hole there. They are constantly seen and frequently shot. Mr. R. H. Eve, of Maldon, has a fine specimen, shot in the Blackwater at Beeleigh. It measures forty-nine inches, and weighed 28½ lbs. An otter is occasionally found in the Stour, between Wixoe and Baythorne Mills, and almost in every case inhabits a certain favourite tree in Mr. G. Unwin's meadow. Once three were found there together. This spring, my cousin, Arthur Fitch, bolted a fine dog into a sack from this haunt. It weighed 23 lbs., and measured 53 inches from tip of nose to end of tail. It was kept in a tank at Mr. Unwin's for a week, and then hunted at Steeple Bumpstead, but did not give much sport. Since then the couch and spraints of an otter have been noticed in the same locality. I know of one gentleman who has already shot three otters this year from the Stour, at Sudbury. With a little protection and a little less ruthless persecution, we might still hope to emulate the deeds of 1796 in Essex, when nine otters were hunted and killed in one day. See Bell, "British Quadrupeds," p. 134.—EDWARD A. FITCH, F.L.S., Maldon.

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[1] We are indebted to Mr. Stopes for the map, which has been specially prepared for this paper.

THE ESSEX FIELD CLUB.

ORDINARY MEETING, Saturday, April 30th, 1887.

THE Seventy-seventh Ordinary Meeting was held at the Public Hall, Loughton, at seven o'clock; Mr. T. V. Holmes, president, in the chair.

Donations of books and pamphlets for the Library were announced from the following:—Mr. W. White, Mr. F. Challis, Mr. Miller Christy, The Smithsonian Institute, the Entomological Society, and the Liverpool Literary and Philosophical Society. Many parts of "Transactions," etc., had been received in exchange, and the Librarian announced several additions by purchase.

Messrs. C. B. Bowes, Noel Buxton, and Percy Lloyd, were elected members.

Mr. J. C. Shenstone sent up for exhibition photographs of the British urns found near Nayland, Suffolk, and Wix, Essex, referred to in the ESSEX NATURALIST, page 35 *ante*.

The Secretary stated that Mr. N. F. Robarts had called his attention to the gravel diggings by the road between Chigwell and Abridge. The gravel was a patch of river-gravel of the Roding; and from flakes, etc., already found, it was probable that the gravel would be found to contain specimens of worked flints.

A paper entitled "On Some Essex Boulders," by the Rev. A. W. Rowe, M.A., F.G.S., was taken as read: it will appear in an early number of the ESSEX NATURALIST.

Mr. F. Carruthers Gould then delivered a very interesting and eloquent lecture entitled "Bird Harmonies in Nature." The chief points treated of in the lecture were referred to in the syllabus placed in the hands of the members, which was as follows:—

Harmony between the animate and inanimate parts of Nature—Desolation and Destruction; the Mountain and the Eagle—The Moorlands and the Blackcock—The Loch; Solitude, a harmony in green, grey and silver.

The Woodlands; the Jay and the Woodpecker—The river sands and marshes; Sandpipers and Peewits—In the Fens; the Bittern—On the Sea Shore—The cliffs and rocks; the fishing folk, Cormorants and Gulls.

Night and Day; the Owl and the Swallow. The Nightingale. Civilisation and morality amongst birds—their attributes—conclusion.

The lecture was illustrated by several life-size crayon drawings of scenes in bird life, from the pencil of the lecturer.

A discussion on several points in the lecture was raised by Dr. Cory, the President, Mr. Crouch, Mr. Varley, Mr. W. Cole, Mr. Ridley, and the lecturer; and a vote of thanks was passed to Mr. Gould.

The President stated that several members who had not paid subscriptions for periods ranging from two to five years had been struck off the list by the Council that evening. The names were read out, and the list was ordered to lie upon the table for the next few meetings, for the information of the members.

Tea and coffee, etc, were served at the close of the meeting, as customary.

MEETING AT THE BRITISH MUSEUM OF NATURAL HISTORY, Saturday, May 7th, 1887.

THE members and their friends, to the number of about eighty, assembled in the Lecture Room, behind the Entrance Hall, of the British Museum of National History, Cromwell Road, at half-past three o'clock, where they were received by

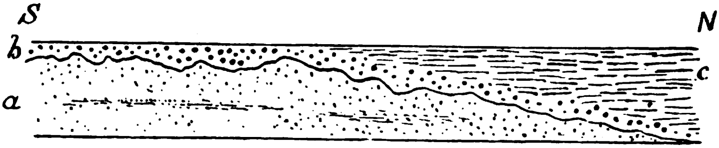
Professor W. H. Flower, LL.D., F.R.S., F.L.S., Pres. L.S., etc. (*Director of the Natural History Department, and one of the Honorary Members of the Club.*) Prof. Flower delivered a most interesting and useful address, taking as his subject the "Structure and Modifications of the Wings and Feet of Birds," with especial reference to the introductory collection exhibited in one of the alcoves in the Central Hall of the Museum. The lecture was illustrated by specimens, and drawings on the black-board. These introductory collections serve much in the same way as the preliminary chapters of any good book on ornithology, ichthyology, entomology, botany, etc., to guide the student to a correct appreciation of the general structure and principal modifications of the limbs and organs of the animals and plants now or formerly inhabiting the earth. It is not too much to say that a few hours' careful study of the specimens exhibited in any one class would do more to instruct visitors than days of aimless wanderings among the countless cases in the main galleries of the Museum. We believe that the idea of such collections originated with Sir Richard Owen, and the details are now being worked out and amplified by Prof. Flower and his assistants, in a way which will earn the gratitude of all who visit the museum for study or even for rational recreation.

A hearty vote of thanks was given to Prof. Flower, on the proposal of Mr. T. V. Holmes, seconded by Prof. Boulger.

At the close of his address, Prof. Flower announced that Lord Walsingham had presented to the museum the whole of his collections of the larvæ of Lepidoptera, preserved in such a way as to retain their natural forms and colours. It is unfortunately necessary to keep entomological collections in the dark, long continued exposure to light greatly injuring the colours; but Prof. Flower said that Lord Walsingham's series of caterpillars was of such great biological interest, and the specimens of such great beauty, that it had been resolved to exhibit it in its entirety in the Great Hall of the Museum for a few weeks, commencing with the Whitsuntide holidays, before consigning it to the cabinets in the Entomological Department of the Museum. Our members will recollect that a portion of this collection was kindly shown by Lord Walsingham at a meeting of the Club last year, on the occasion of a lecture on the colours of larvæ by Mr. Poulton.

We may also point out that the rooms devoted to the British collections of natural history are now open, and that a most excellent series of nearly all classes of our native animals are shown. These collections will be of the greatest value, both to beginners and to advanced students.

Geological Section at High Beach, Epping Forest.—On April 18th Mr. H. B. Woodward, Prof. Meldola, Mr. W. Cole, and I, inspected the excavation made at the site of the new reservoir to be constructed at High Beach. We found the section to consist of drift gravel and clay, resting upon Lower Bagshot sand. The Bagshot sand was of a greenish yellow colour, and contained thin seams of pipeclay. About seven feet of it were seen. The exact age of the overlying gravel and clay is somewhat doubtful. Mr. Whitaker thinks it either pre-glacial or the oldest drift of glacial age in the district. Beds of similar age may be seen at Jack's Hill and at Gayne's Park, in the Epping Forest district. The junction between this drift gravel and the underlying sand was, as usual, highly irregular. Quartz pebbles were found here and there in the gravel—a feature distinguishing it from the old Tertiary pebble-beds, which are entirely composed of rolled flints. At the southern end of the excavation, which was about sixty yards long, the Bagshot sand rose to within two feet of the surface, while towards the northern end the drift came down deeper and deeper, the gravel becoming, in its turn, covered by clay containing scarcely any pebbles except at the bottom, and the Bagshot sand disappearing altogether. The generalised section here given illustrates the nature of the change. The depth of the excavation was from eight to nine feet.—T. V. HOLMES, May, 1887.



ROUGH SKETCH OF SECTION EXPOSED AT HIGH BEACH.

Discovery of a Denehole at Frindsbury, near Rochester, Kent.—Many readers of the ESSEX NATURALIST being interested in deneholes, the following particulars may be acceptable. At the beginning of March the Rev. H. Day of Frindsbury kindly informed me of the recent discovery of a denehole at that place. Various circumstances, however, prevented me from visiting Frindsbury before April 14th, when Mr. Walter Crouch and I found the pit covered in and about to be converted into a cesspool. We were, accordingly, glad to learn that it had been thoroughly inspected, among others, by Mr. F. C. J. Spurrell, who had taken measurements of it and notes of its peculiarities. It was discovered during the making of an excavation in the brickyard of Mr. West, which is situated westward of the road between Frindsbury and Bill Street, and is only a few yards south of the latter place. We were informed that the section of the shaft showed more than thirty feet of loamy beds above the chalk, the thickness of the chalk roof being less than two feet. Mr. Spurrell, in his well-known paper, states that there are many holes in the chalk hills near Rochester, but that "they usually enter the chalk immediately, there being no *humus* whatever." This Frindsbury pit thus furnishes a curious exception to the general rule, being nearly in the centre of a belt of overlying Tertiary ground, which, measured along the Frindsbury and Bill Street road, is just half a mile in breadth, the chalk cropping out on both sides of it.—T. V. HOLMES, May, 1887.

Deneholes and Cesspools.—The conversion of the newly discovered Frindsbury denehole into a cesspool reminds me of the fact that in addition to converted, or perverted, deneholes, the inhabitants of towns and villages situated on the chalk have been, and in many cases still are, accustomed to drain into cesspools excavated in that formation. Indeed, provided that the supply of drinking water is obtained from some distant and unpolluted source, chalk, from its singular combination of softness and coherence, is remarkably well adapted to the cesspool system of drainage. For a long time the liquid refuse percolates through the sides, so as to obviate any necessity of emptying the cesspool; but gradually, percolation almost ceases, in consequence of the deposit of greasy matter. Then, after being emptied, the sides of the pit are chipped, so as to obtain a fresh chalk surface, and everything goes on as before. It is obvious that this periodical enlargement of the pit would often result in the making of an excavation which might with equal probability be supposed to be either a disused cesspool or a perverted denehole. It may be remembered that the deep denehole at Eltham Park, discovered in 1878, the floor of which was 140 feet beneath the surface, had been used as a cesspool, in the time of former owners of the land, for at least a century—perhaps for two or three, in the opinion of Mr. Flinders Petrie. Yet the only existing evidence of this former use—apart, of course, from the drain to the shaft—consisted of a deposit of inodorous mud about six inches thick. The shaft was capped, when discovered, by a semi-circular brick arch, the crown of which was only six inches below the surface.—T. V. HOLMES, May, 1887.

ENTOMOLOGICAL NOTES FROM AN OLD POCKET-BOOK.

By JAMES L. ENGLISH.

[*Read October 25th, 1884.*]

A FEW notes of the doings of insect-hunters in Epping Forest and its neighbourhood forty-six years ago, and in other remarkable times from 1838 to 1862, may be of interest to some of our entomological members. I have therefore put together the following lines, chiefly from the records contained in an old pocket-book, and partly from recollection.

I had the good fortune to commence collecting lepidoptera within a cycle of years noteworthy for the appearance in abundance of many of the rarer forms of insect life. Perhaps one is apt to exaggerate the goodness and pleasure of bygone years, but on looking over an old cabinet of butterflies and moths, some of our young aspirants may well be surprised at the many examples exhibited of species which are now very rarely, or indeed never, met with, despite the energetic exertions of our modern collectors.

The winter of 1837-38 was very cold, with heavy falls of snow, which remained where it had drifted on the north side of Gaynes Park Wood, near Epping, until after the 18th of May. But the spring weather was warm and genial, and the early caterpillars were nearly full-fed by that date. At the beginning of May I had taken *Asphalia (Cymatophora) ridens*.[1] *Tephrosia punctulata* was common, its rarer congener, *T. Consonaria* frequently occurred, and on several occasions I very gladly boxed the noble *Notodonta trepida*—species which are now of the greatest rarity in this locality, if, indeed, they are ever noticed. The common spring larvæ came forth in legions: so vast were the numbers that whole woods—Gaynes Park, Hill Hall and Ongar Park Woods—were defoliated, and at mid-summer had the appearance of mid-winter, with leafless and blossomless trees. The caterpillars of the pretty December moth *(Pœcilocampa populi)* might have been counted in thousands, and those of *Agriopis aprilina* were common in the crevices of the oak bark.

The following year (1839) was nearly the counterpart of the preceding one, being, if possible, even more prolific in insect life, and species not before noticed put in an appearance in considerable numbers. The curious caterpillars of the Purple Hair-streak butterfly (*Thecla quercus*) abounded to such an extent that nearly half the brood was starved, the leaves of entire oak-trees not affording sufficient grazing for the support of all; and a like fate overtook the teeming families of several other species. The delicate Wood-white butterfly (*Leucophasia sinapis*) was plentiful in the woodland glades. *Nemeobius lucina* flew in the woods above mentioned, as well as in the open forest lands: it held its own fairly well for three years, and then suddenly vanished, never to appear again within my knowledge. The same year *Melitæa aurina* (*artemis*) occurred in Ongar Park and at High Beach, with *M. athalia*, but these butterflies were never seen in after years.

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[1] In default of a distinctly authoritative list of our British lepidoptera, we propose to follow the "'Entomologist' Synonymic List of British Lepidoptera,"—compiled by Mr. Richard South (London, 1884. West, Newman & Co., 54, Hatton Garden, E.C. Price 6d.)—in future papers treating of our native forms. Mr. South mainly follows the arrangement and nomenclature of Dr. Staudinger and Dr. Wocke, and his list, although possibly far from perfect, yet appears to be more in accordance with present knowledge than Doubleday's list, for so many years used by British collectors.—ED.

Previous to 1839, only one pair of *Notodonta dromedarius* had been seen in the forest district. It now made its appearance, and increased in numbers year after year for some time, until it became our most common prominent moth; I have often seen when beating twenty pairs in one day. Like some other species, it continued to abound until it had reached its maximum in point of numbers, and then suddenly we lost sight of it altogether. The other prominent moths, *Notodonta dictæa*, *N. dictæoides*, *N. ziczac*, *N. chaonia*, and *N. trimacula* (*dodonea*), occurred season after season for many years, with the other usual wood occupants and a continued profusion of insect life. In 1843, *Glyphisia crenata* was taken in Ongar Park Wood, and subsequently two other examples, all females. They are now in the Doubleday Collection in the Bethnal Green Museum. The only male specimen of this species that I have seen was bred by a person in the neighbourhood of the New Forest, and is now in the possession of our member, Mr. J. J. Mann. In 1844, on May 2nd, a fine pair of *Lophopteryx carmelita* were found at rest on an oak trunk. I well remember that day—the bright sun and delicate, soft, spring air, and the wood teeming with insect life. In July, the beautiful *Geometra papilionaria* occurred in numbers. I noticed that the bats appeared to be very partial to this moth, and certainly must have destroyed multitudes. I was surprised one morning in particular at the havoc made, for in one "ride" I picked up quite three dozen pairs of the light-green wings of the poor insects, all neatly clipped off by the bats the evening before. The handsome butterfly, *Argynnis adippe*, was then common, but I have not seen one now for many years. In August another rare and much prized butterfly, *Colias hyale*, occurred in numbers, similar to the outburst of its congener, *Colias edusa*, a few years ago. Every flowery field and garden abounded with them, and they were common among the thickets on Fairmead Plain.

The winter of 1845-46, and the spring of 1846, were remarkably genial—no frost or snow, reminding one of the past winter (1883-4). On February 28th, a fine and warm day, I went into the woods. There were the usual hybernated butterflies sporting in profusion in the bright sunshine. The beautiful day-flying moth, *Brephos parthenias*, was then out—the earliest appearance I have on record, its usual time being about the middle of March. The large sallow (*Salix caprea*) was then in blossom, and many of the *Tæniocampæ* were out in the evening, busily engaged on the catkins in company with the geometers *Larentia multristrigaria* and *Selenia bilunaria* (*illunaria*). That season the appearance and growth of insect life and vegetation was one of continued progress: there were no cold evenings to kill the moths and keep the Entomologist at home. By the middle of March the blackthorn was in full blossom, and I visited it to find *Anticlea nigrofasciaria* (*derivata*) and *Eupithecia exiguata*, both commonly; but the latter is now very scarce. From that time to the middle of April the hybernated *larvæ* were found to be unusually common when searched for at night by aid of a lanthorn. So early was the season, that many of the Noctuæ were out and sipping the sugar I had spread on the trees by May 14th—*Apamea basilinea*, *Xylophasia rurea*, *Hadena adusta* and *Noctua rubi* (*bella*). The lovely Bee-moth, *Macroglossa fuciformis*, first seen on May 1st, was common with *Sesia culiciformis*, on the flowers of the Wood-spurge. Also *Erastia fasciana* (*fuscula*) and *Melanippe hastata* were then plentiful—but are now things of the past in my later experiences.

The continued fine season of 1846 and the delightful profusion of insect life, induced me to journey to the Fens in Huntingdonshire, where I located myself in the village of Yaxley, close to Whittlesea Mere, there to while away the time amidst the rushy moors, studded with the Sweet Gale or Bog Myrtle, the favourite food-plant of the Gipsy-moth, whose caterpillars I found feeding upon it. Here I had the good fortune to capture that extremely rare moth, *Noctua subrosea*, and so to settle the vexed question as to whether it was really a British insect. I was also delighted to catch three Large Copper butterflies (*Polyommatus dispar*), the last specimens, I believe, of that grand and long-lost species ever taken in England. I also met with *Nonagria cannæ*, then new to Britain, and always extremely scarce.

In the autumn of that year (1846), the great Convolvulus Hawk Moth (*Sphinx Convolvuli*), was out in great abundance, and I hardly think that it has occurred so abundantly since.

My excursion to Yaxley was so successful that I was induced to to go again the following year (1847), only to see the Great Northern line staked out between the villages of Holme and Yaxley. Then came the draining of the Mere (once one of the most extensive pieces of water in England), the burning of the sedge and the beautiful marsh plants; and then Whittlesea Mere, with its choice flora and fauna, became only a memory.

But to return to Epping Forest. I have no notes of any importance between the years 1847 and 1862, as my occupations prevented me from doing much work in collecting. The year 1862 was also a very favourable one for insect life, and the spring was very mild. On January 31st, at six a.m., my thermometer recorded 52 degrees Fahrenheit, and *Hybernia leucophearia* was out on the wing. On February 4th the thrush was singing, and *Phigalia pedaria* (*pilosaria*) was seen, and our friends, the bats, were out of doors. The weather continued mild until the 19th, when the first honey-bee was seen, and the thermometer stood at 55 degrees. April set in pleasantly, and hybernated larvæ were very plentiful from the 8th to the end of the month. On April 30th, *Drepana cultraria* (*unguicula*), *Tephrosia consonaria*, and *Lobophora viretata* were out: the last named rare species has not been found in the forest for many years. The same year *Notodonta chaonia* occurred at rest on trunks on the outskirts of Monk's Wood.

The forest has not greatly changed since these grand entomological seasons. What unknown cause has occasioned the dearth of these interesting insects in late years? The woods are there, the food-plants still flourish; but where are the insects?

Reptilia.—The following appeared in the "Essex Weekly News," Feb. 18th, 1887:—"A NEST OF ADDERS.—A curious discovery was made the other day at Saltcourt Farm, Goldhanger, in the occupation of Mr. H. Rush. Some carpenters were removing an old gate post at the entrance of the farm in order to put down a new post, and when the old post was lifted, in the space at the bottom they came upon a nest of adders (19 in number), consorting with which were three snakes and two swifts. The adders were all about three-quarters grown, and were in a dormant state. It is needless to add that the whole of this interesting family of congeners was speedily removed from the reptiliary 'census.'" I have seen Mr. Hayward Rush, who tells me the above is quite correct, with the exception that the adders were seventeen in number and the snakes two. The adders were apparently of two families, part being from ten to twelve inches long, the others measuring about fifteen inches. It was upon this same farm that one September some years ago, when Mr. William Wakelin and Mr. George Hurrell were shooting with Mr. Rush, a curious black object as large as a football was noticed in a hedgerow stub (probably oak), about six feet from the ground, which proved to be a nest of snakes closely intertwined, estimated to consist of at least twenty individuals. These Mr. Wakelin shot to pieces; the recent nest of adders were chopped to pieces. Although mentioned by Bell, and well known to occur in a lesser degree, this gregarious habit of our reptilia is at least interesting.—EDWARD A. FITCH, F.L.S., Maldon.

LIBRARY AND PUBLICATIONS OF THE ESSEX FIELD CLUB.

It is requested that all enquiries respecting the Library, donations of Books and Periodicals for the same, *and all orders for the Publications of the Club*, be sent to the LIBRARIANS at the HEAD-QUARTERS, 8, KNIGHTON VILLAS, BUCKHURST HILL, ESSEX.

All the Publications of the Club are still in print, but Parts 3 and 4 can only be supplied with complete volumes:—*President's Inaugural Address*, 6d.; *A Day's Elephant Hunting in Essex*, 1s.; *Transactions*, Part 1, 1s.; Part 2, 2s.; Part 5, 5s. 6d.; Part 6, 7s. 6d.; Part 7, 10s. 6d.; Part 8, 5s. 6d.; Vol. I., unbound, 6s.; Vol. II., unbound, 15s; Vol. III, unbound, 16s.; Vol. IV., Part 1, *Transactions*, 5s.; Part 2, 3s.; Do., *Proceedings*, 3s.; *Report on East Anglian Earthquake*, see below; *Reports on the Explorations of the two Ancient Camps in Epping Forest*. A few authors' copies of these Reports are in hand, price 4s., post free.

Papers and Memorials on the Protection of Wild Animals and Plants, and the present condition and future management of Epping Forest, 1s.

Part 2 Vol. IV., of *Proceedings*, will be published shortly, and will complete the old series.

Cheaper Issue, 8vo., Price 3s. 6d.

ESSEX FIELD CLUB SPECIAL MEMOIRS, VOL. I.

REPORT ON THE EAST ANGLIAN EARTHQUAKE OF APRIL 22, 1884. By RAPHAEL MELDOLA, F.R.S., F.C.S., F.R.A.S., &c., Professor of Chemistry in the Finsbury Technical College, City and Guilds of London Institute; and WILLIAM WHITE, F.E.S., Member of the Geologists' Association. Drawn up by R. MELDOLA, and read in Abstract at the Meeting of the Essex Field Club, February 28, 1885. With Maps and other Illustrations. Cheaper Issue, 8vo., 3s. 6d.

The *Athenæum* says:—"A distinctly valuable contribution to our knowledge of a subject of much obscurity. . . . The subject is one which only a few specialists will pursue within its narrower limits, but the curious facts collected, and the odd scraps of history referring to past earthquakes which have been gathered together are so numerous, so unexpected and so well set, that the book will be found extremely interesting to the general reader, as well as a suggestive and severe study for the man of science."

Published by MACMILLAN & CO., Bedford Street, Covent Garden, and the
ESSEX FIELD CLUB, Buckhurst Hill, Essex.

To be had by order of all Booksellers.

THE ESSEX NATURALIST.

All contributions, books for review, &c., &c., should be sent to the EDITOR, MR. W. COLE, 7, KNIGHTON VILLAS, BUCKHURST HILL, ESSEX.

Papers, notes, memoranda, &c., relating to the Natural History, Geology, and Pre-historic Archæology of Essex, will always be welcomed.

N. B.—MEMBERS can obtain all the publications of the Club at a reduction of 25 per cent. from the published price, by sending their orders to the LIBRARIANS at the Head Quarters, 8, Knighton Villas, Buckhurst Hill, Essex.

Special Notices to Members.

The Ordinary Meeting, which in the usual course would take place on Saturday, May 28th, *will not be held*, owing to the Whitsuntide holidays. The Ordinary Meetings will be resumed in October; but Meetings for the proposal and election of Members will be held in connection with Field Meetings during the Summer. The following stand for election as Members at the next Meeting:—

W. E. Bovill, Moulsham Mill House, Chelmsford.
H. J. Cook, "The Firs," Woodford.
Mrs. H. J. Cook, "The Firs," Woodford.
S. A. Courtauld, Cuthedge, Halstead.
T. Gowland, 111, Lothair Road, Finsbury Park.
Mrs. S. Hall, 19, Aberdeen Park, Highbury.
Mrs. H. Wall, "Eversley," Buckhurst Hill.

Field Meetings.—In order to relieve the Hon. Secretary of part of his duties, which for some time have been too numerous and onerous for the successful fulfilment of them all, the Council at its Meeting on Friday, May 20th, appointed a Sub-Committee to arrange and take charge of all future Excursions. As soon as possible after the First Meeting of the Committee, a statement will be issued as to arrangements for the present season. Such announcements will either be made on the back page of the wrapper of the Essex Naturalist, or by separate circulars.

SUBSCRIPTIONS.

Subscriptions for 1887 *became due on January 1st last*, and should be sent at once to the Treasurer, Thomas Royle, Esq., "The Cedars," West Ham, Essex. Post Office Orders should be made payable at Stratford, E., and Cheques crossed "London and County Bank," Stratford Branch.

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The
Essex Naturalist:

BEING THE

JOURNAL ["TRANSACTIONS" AND "PROCEEDINGS"]

OF THE

ESSEX FIELD CLUB.

EDITED BY

WILLIAM COLE,
Honorary Secretary.

Contents:

PAGE

Notes.—*Lobophora viretata*, Hb. in Epping Forest—HILDEBRAND RAMSDEN, F.L.S.; *Notodonta trepida* (Esp.). near Brentwood—R. G. WILLIMENT; *Chærocampa porcellus* (*L.*) in Epping Forest—CHARLES OLDHAM; Golden Oriole (*Oriolus galbula L*) at Purleigh—EDWARD A. FITCH; The Barnacle Goose (*Bernicla leucopsis* Bechstein) at Tollesbury—FREDERICK SPALDING; The Badger (*Meles taxus*)—EDWARD A. FITCH; Great Pipe Fish (*Syngnathus acus*, Ray) at Maldon—E. A. FITCH; The "Burnt" or "Red" Hill in Mersea—From "Mehalah. a story of the Salt Marshes, by Rev. BARING GOULD; The Mollusca of Essex—J. E. HARTING 113

"Report on the Flowering Plants Growing in the Neighbourhood of Colchester" (Additions and Corrections)—By J. SHENSTONE, F.R.M.S. 116

Some Essex Boulders—By Rev. A. W. ROWE M.A., F.G.S. 117

Note.—Essex Heronies—ED. 119

The "Essex Emerald" Moth (*Phorosdesma smaragdaria*)—ED. 120

Note.—There were Giants in those Days- Camden's "Britannia"... 124

"Primæval Man in the Valley of the Lea" (*Illustrated*)—By WORTHINGTON G. SMITH, F.L.S. 125

The authors only are responsible for the statements and opinions contained in their respective Papers.

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1887.

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The Editor of "THE ESSEX NATURALIST,"
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Forthcoming Meeting of the Essex Field Club.

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EXCURSION TO SUDBURY (SUFFOLK)

(*In conjunction with the* GEOLOGISTS' ASSOCIATION),

SATURDAY, JULY 9TH, 1886.

Conductors:—Dr. J. S. HOLDEN and W. WHITAKER, B.A., F.R.S., F.G.S., etc.

Leave Liverpool Street Station (G.E.R.) by train at 10, due at Sudbury at 11.45 a.m.

Members are recommended to assemble at Liverpool Street Station not later than 9.40, in order that arrangements may be made for a reduction of fares.

PROGRAMME.

The finest set of inland sections of Glacial Drift in the Eastern Counties may be seen close to the town, and the most westerly sections of Crag. The older Tertiary beds are also well shown.

Cross to the Essex (right) bank of the Stour to see the fine sections at Balingdon. The great Chalk pit shows a little London Clay, a little of the Reading Beds and Thanet Sand. At the large brick-yard, "The Grove," close by, Drift comes on suddenly, cutting down through the Thanet Sand to the Chalk below the bottom of the valley, and it consists of varying beds of Boulder Clay, gravel, and brick-earth.

Crossing again to Sudbury, the large pits near the Railway Station will be visited, and the extraordinary and sudden on-coming of the Drift in the lower part will be seen, the Thanet Sand being carried down beneath the Drift, as though by disturbance. Going up the slight rise to the north, the brick-yard on the top with its fine development of Glacial brick-earth will be examined, and then the series of large pits along the valley just north-east of the town, which show various kinds of Drift; also Crag, Thanet Beds, and Chalk.

If time allows, the pit at the Waterworks may also be seen.

It should be understood that many of the pits have been so much worked that their sections may have much altered since they were described by the Geological Survey in 1878. All are within a radius of a mile from the centre of the town, so that the amount of walking involved in seeing them is not very great.

family of congeners was speedily removed from the reptiliary 'census.'" I have seen Mr. Hayward Rush, who tells me the above is quite correct, with the exception that the adders were seventeen in number and the snakes two. The adders were apparently of two families, part being from ten to twelve inches long, the others measuring about fifteen inches. It was upon this same farm that one September some years ago, when Mr. William Wakelin and Mr. George Hurrell were shooting with Mr. Rush, a curious black object as large as a football was noticed in a hedgerow stub (probably oak), about six feet from the ground, which proved to be a nest of snakes closely intertwined, estimated to consist of at least twenty individuals. These Mr. Wakelin shot to pieces; the recent nest of adders were chopped to pieces. Although mentioned by Bell, and well known to occur in a lesser degree, this gregarious habit of our reptilia is at least interesting.—EDWARD A. FITCH, F.L.S., Maldon. [It may be convenient to print here the following extract from a letter received from Mr. Fitch, dated Maldon, May 23rd, 1884, giving a few notes on our snakes and the slow-worm:—"Last week I measured a very fine specimen of the common snake (*Natrix torquata*, Ray), caught at Stokes Hall, Althorne, near Maldon; it was 47½ inches long. Our ophidians seem to be unusually abundant this year. On two consecutive Sundays in April thirty-six adders have been killed on Danbury Common, several of them, I am told, being quite a yard in length. Numerous snakes were also killed, but no record was kept of them. Parties of men persecute the adders every spring, with the idea of protecting the various animals soon to be turned out on the common to graze. Mr. Herbert records a slow-worm (*Anguis fragilis*), measuring 17½ inches in length, caught at Southend on May 4th last ("Field" lxiii. 650). I have noticed, but not measured, several large specimens this year. Many of the prettily marked young were turned out in digging an old orchard here last winter."]

Lobophora viretata, Hb. in Epping Forest.—In his entomological notes (*ante* p. 112), Mr. English mentions taking *Lobophora viretata*, on 30th April, 1862, adding that the species has not been found in the forest for many years. I see, however, by reference to my cabinets that I took the moth in June, 1878, in the forest just to the north of Hagger Lane, Walthamstow, between the New Road and Cook's Folly.—HILDEBRAND RAMSDEN, F.L.S., May, 1887.

Notodonta trepida (Esp.), near Brentwood.—On May 16th I found two fine specimens, male and female, of *N. trepida* on the trunk of an oak tree near the once celebrated "Devil's Head." The female has laid more than three hundred eggs. I think it is unusual for any of the Notodontidæ to deposit so large a number of *ova*. I annually take *Stauropus fagi*, and have observed that the females produce on an average one hundred and fifty eggs.—R. G. WILLIMENT, Brentwood, June, 1887.

Chærocampa porcellus (L.), in Epping Forest.—On June 4th I took a specimen of the "Small Elephant Hawk-moth" *(C. porcellus)* at rest at Loughton, and another at Theydon Bois on the 11th inst. Both are in fine condition.—CHARLES OLDHAM, Woodford, June 13th, 1887.

Golden Oriole (*Oriolus galbula L.*) at Purleigh.—I was pleased this morning to see a male Oriole fly out of a tall hedge by the roadside, almost opposite my Mosklyns farmhouse. I was on horseback and followed it gently, flushing it twice along the road towards Hazeleigh; it eventually took refuge in my little Boxiron Grove, where I trust, if it has a mate, it may continue its beautiful, though perhaps too attractive presence.* One midsummer holidays about eighteen years ago, I saw an oriole twice or thrice at Wixoe, in Suffolk, and Baythorne End Essex, I well remember seeing it on both sides of the river; it was the same year that Mr. Squire shot a Hoopoe at Wixoe Park.—EDWARD A. FITCH, Maldon, June 9th, 1887.

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* ["Very little is known of the habits of the Golden Oriole in this country; for the brilliant plumage of the male always attracts attention, and, though being far from rare, it is almost invariably pursued with the greatest eagerness, and shot down by some of those persons who imagine that they are thereby aiding the cause of natural history; fortunately greater facilities for its observation occur on the Continent, and in Italy particularly, these birds are common." Yarrell's "British Birds," fourth edition, by Professor Newton, F.R.S., p. 234.—ED.]

The Barnacle Goose (*Bernicla leucopsis*, Bechstein) **at Tollesbury.**—On passing Mr. Hall's shop, at the top of North Hill, Colchester, on 18th January last, I noticed three specimens of the Bernicle (or Barnacle) Goose (*Bernicla leucopsis*, Bechstein), shot at Tollesbury. These birds, which are common throughout the North of Europe, are rare in Eastern England, being only occasionally seen in severe winters. The Rev. F. O. Morris mentions a pair as having been killed at Salthouse, in Norfolk, January, 1848, and one in my father's collection at Westleton, was shot by him at Ditchingham, in Norfolk. Mr. Hele, in his "Notes about Aldeburgh," says that one "a very beautiful male," was killed in the Orford River, on 29th January, 1886, and the Rev. Dr. Babington in his truly valuable "List of Suffolk Birds," speaks of this goose as "now a rare winter visitant. Only a few specimens have been met with on the coast of late years." He records nine specimens killed at Breydon and neighbourhood of Yarmouth, and one at Gedgrave, in Suffolk. I find no note of any Barnicle geese having been killed in Essex, but an eminent naturalist and ornithologist in Colchester, informs me that he has known of several shot, as in the above case, in very sharp weather, and cautions me not to cook that I bought of Mr. Hall's, they being tough, strong, and wholly unfit for eating. He has known instances of the Barnicle goose being allowed to pass without a shot (while more tempting fowl were within reach), on that account.—FREDERICK SPALDING, Colchester, January 21st, 1887.

The Badger *(Meles taxus).*—Mr. Laver rightly speaks of the badger as well nigh extinct in this country (Trans. Essex Field Club, ii., 164), and I have been disappointed this year in obtaining a young Essex specimen, as I had hoped. Three years ago a pair of badgers took up their abode in Mr. H. R. G. Marriott's, Park Wood, Shalford; two years ago one old one and the five young ones were taken, another pair were again there last year, and this spring the wood has been visited by badgers, but I cannot hear that they have bred in the neighbourhood. Other members may know something of their whereabouts; if so, their presence should be noted, as although once abundant, doubtless now the badger is a rare animal in the home counties. They occurred regularly in the Braxted woods a generation ago, and I have heard of them as being in the Woodham Hall woods five and twenty years ago, but I do not think any have been seen recently. They still linger in Hertfordshire (see Dr. A. T. Brett's note in Trans. Herts. Nat. Hist. Soc., iv, 120; January, 1887).—EDWARD A. FITCH, Maldon, June, 1887.

Great Pipe-Fish (*Syngnathus acus*, Ray) **at Maldon.**—While fishing in the Blackwater to-day (June 11th) I was interested in getting a fine male specimen of the Great Pipe-fish (locally called "snakes"). When drying on deck, the abdominal pouch of the fish opened and showed the bright orange-coloured *ova* quite plainly. This is the first time I have seen this, but I was always interested in Yarrell's account ("British Fishes," ii., 435) of how the male carries the *ova* in a large sub-caudal pouch. My specimen is a fine one, 16½ inches in length, but only turned the scale at just over 1 oz. The abdominal pouch which opened, apparently by contraction upon, or rather before, the death of the fish, is 5½ inches in length, and contains about 480 comparatively large *ova*. They are globular, exceeding 2 mm. in diameter, of a pale orange colour, with a very bright orange spot at the apex. About one-fifth (those nearer the head of the fish) are white with the orange spot paler; the eggs are arranged in eight rows—four on each side—each row consisting of from sixty to sixty-three eggs, closely agglutinated. I also caught to-day the finest "Father Lasher" (*Cottus bubalis*, Euphrasen, locally called "Bull-rout") that I have seen in this river. It measures a good 8 inches, and weighs 5 ounces.—EDWARD A. FITCH, Maldon, June 11th, 1887. [It may be well to add a few words on the very remarkable arrangement by which the immature *ova* of *Syngnathus* are "nursed" by the male fish until ripe for hatching. Mr. Day, in his "Fishes of Great Britain and Ireland," says that the male has the abdomen from the vent to the anal fin broader than in the female, and there are two soft, cutaneous folds or flaps, about two-thirds of its length, which when brought together form a pouch. When Yarrell wrote, the manner in which the *ova* are transferred from the female to the sub-caudal pouch of the male was unknown, but Mr. Andrews in the "Zoologist" for 1860 (vol. xviii., p. 7,053), has given some details which are worth quoting:—"In shoal water or a low tide these fish may sometimes be seen in pairs, side by side, apparently stationary on some rocky stone. At this time the *ova*—the capsules being but imperfectly matured—are liberated from the female, and received into the abdominal sac of the male, the male fish having the power of expanding the lappings of the sac and attaching the *ova* by a highly viscid or glutinous secretion. As the process of maturation advances, the capsules of the *ova* enlarge, forming hemispherical depressions in the sac, and eventually the pouch is forced open by the full development of the *ova* and the extrication of the young."—ED.]

The "Burnt" or "Red" Hills in Mersea.—"Through all the low flat coast land of this region [Mersea], above the saltings, or pasture overflowed by high tides occasionally, are scattered at irregular intervals large, broad, circular mounds of clay burned to brick-red, interspersed with particles of charcoal. A few fragments of bone are found in them, relics of the meals of those who raised these heaps, but they cover no urns, and enclose no cists, they contain no skeletons. They were never intended as funeral monuments, and are quite different from the hoes or barrows, which stand on high land, and which were burial mounds. The burnt or red hills are always situate at high water mark; near them, below the surface of the vegetable deposit, are multitudes of oyster shells. Near them also are sometimes found, sunk in the marsh, polished chert weapons. Who raised these mounds? For what purpose were they reared? These are questions which cannot be answered satisfactorily. One thing is certain. An immense amount of wood must have been consumed to burn such a mass of clay, and the country must then have been more overgrown with timber than at present. Many of the mounds are now enclosed in fields by sea walls which hold out the tide, the plough has been drawn over them, and the spade has scattered them over the surface, colouring a whole field brick-red, and making it rich for the production of corn. There is no better manure than a red hill. But why were these mounds so laboriously raised? The tradition of the marsh-dwellers is that they were platforms for huts, the earth burned as a preventive to ague*. It is curious that in the marshy regions of central Africa, the natives adopt a precisely similar method for their protection from miasma. But why men dwelt in such numbers on the saltings remains undetermined. Whether they lived there to burn the glasswort for nitre, or to steam the sea-water for salt, or to take charge of oyster grounds, is uncertain. Fragments, very broken, of pottery, are found in these heaps, scattered throughout them, but not a specimen of a perfect vessel. The burnt hills are built up on the old shingle of the shore, with no intervening line of vegetable matter, the growth of the marsh has been later and has risen above their bases, and has partly buried them." From "Mehalah, a Story of the Salt Marshes," by Rev. Baring-Gould (1880).

The Mollusca of Essex.—Having undertaken to prepare a list of the Land and Freshwater Shells found in the Epping Forest district, I should be grateful to any one who would take the trouble to collect and forward specimens for identification, or furnish me with any information on the subject. The different species should be kept separate, if possible, in pill boxes, to prevent breakage, with a number on each box. Opposite a corresponding number on a list sent with them, should be stated, the precise locality where collected, with an indication of the habitat (whether on trees, amongst moss, on the leaves of water plants, or under stones, or felled timber, etc.), and the abundance or otherwise of the species in the particular locality mentioned. I may add that a little book which I published some years ago, entitled "Rambles in search of Shells," contains very accurately coloured figures, with hints likely to be useful to inexperienced collectors.—J. E. HARTING, Natural History Museum, Cromwell Road, S.W.

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*It has been suggested that possibly one use at least of these "burnt" or "red" hills was to afford a safe retreat for cattle or sheep when the surrounding marshes were overflown. Camden in his "Britannia" (1610), writing of "the Isle Canvey," says, it is "so low that often times it is quite over flowen, all save hillocks cast uppe, upon which the sheepe have a place of safe refuge."—ED.

"REPORT ON THE FLOWERING PLANTS GROWING IN THE NEIGHBOURHOOD OF COLCHESTER."

ADDITIONS AND CORRECTIONS.

BY J. C. SHENSTONE, F.R.M.S.

Ranunculus parviflorus, L. I have recently been informed by Miss M. Gripper that this uncommon plant occurs on three different banks in the parish of Layer Breton. Gibson's localities for the plant in this part of Essex are Colchester, Walton, Tiptree Heath, and Totham Church; the last two places being just outside my district. I have already reported (ESSEX NATURALIST, page 29) that I once, and only once, found the plant at Braiswick, a mile north of Colchester, but that it occurs plentifully just over the border of the county at Stoke-by-Nayland. The new locality given me by Miss Gripper confirms my suspicion that some plants, apparently rare in this part of Essex, are in reality much more widely distributed than we suppose.

Crithmum maritimum, L. An unfortunate clerical error occurred in my remarks upon this plant, making them somewhat unintelligible. The words "Marsh Samphire" commencing the fourth line from bottom of page 26 *ante*, should read "True, or Sea Samphire." The error must have crept in when my notes were transcribed for the press.

Eryngium maritimum, L. In quoting from Morant, I stated (ESSEX NATURALIST, page 30, fifth line from bottom of page) that "they were first candied in this town about the beginning of this century." The quotation should read "the beginning of last century," *i.e.*, the beginning of the 17th century.

Castanea. I have already called the attention to some remarkable oak trees at Thorington (ESSEX NATURALIST, page 34). I have had pointed out to me the following extract from Evelyn's "Sylva," 1664, page 82:—"To speak first of the bulks of some immense trees—there was standing an old and decayed chestnut at Fraiting, in Essex, whose very stumps did yeild thirty sizeable loads of logs." Frating is the adjoining parish to Thorington—it would therefore appear that the district was favourable to the growth of large timber. It is rather difficult to estimate the size of this chestnut tree. I am told that a pollarded tree two to three feet in its largest diameter and ten to twelve feet high, would yield a "sizeable load of logs."

SOME ESSEX BOULDERS.

By REV. A. W. ROWE, M.A., F.G.S.

[*Read April 30th*, 1887.]

In the Essex Naturalist, page 8, a note from Mr. Worthington G. Smith is inserted relative to sandstone and conglomerate blocks found in Essex.

A considerable number of these boulders occur in this part of Essex, and are generally found in the immediate vicinity of farm-yards or inn yards. I have ascertained in the case of some of them, that they have been dug up on the farm, and then brought to the farm-yard to be used as mounting stones, or for some similar purpose; and I have little doubt that most of them have come to their present position in this way. Of the conglomerate, smaller pieces occur frequently, but larger boulders are somewhat rare. A mass of considerable size is lying opposite to "Melbournes," in Great Leighs Parish, a farm occupied by Mr. T. Gooday; it is on the opposite side of the road to the farm, and the greater part of it lies buried in the loose soil; another block of fair size was found on Bourchiers, a farm in Little Dunmow, belonging to Mr. Worrin, and I think it is now built up in his fernery. But large blocks and masses of sandstone are fairly common: at "Prince's Halfyards", a farm about a mile and a half north of Felstead, there is a very large boulder, forming part of a wall in the farm-yard; it was dug up on the farm, and dragged to the farm-yard some years ago, I am informed, and made the beginning of the wall. It measures five feet nine inches in length, is three feet three inches out of the ground in height, and two feet in thickness, but as it lies deep in the ground, the height must be fully four feet six inches. It is a mass of yellowish Carboniferous-sandstone, rather coarse in texture, and has weathered to a greyish colour. Apparently, in common with nearly all the blocks of Carboniferous-sandstone in this neighbourhood, it is unfossiliferous. At North End Place, about two miles south-west of Felstead, there are several of these sandstone boulders of considerable size, two of them are of very close, compact texture, and a third, which measures about three feet by two feet, is of a whitish colour, and contains an abundance of grains of glauconite. Some thirty blocks are built in at the side of a raised roadway, as supports, in the centre of the village in Felstead, all seemingly unfossiliferous except one, which is a mass of dark reddish sandstone, rather soft, and with a peculiar glazed appearance when broken, not like the fractured surface of quartzite, but with more of the appearance of a thin covering of calcite. A much larger block of this same kind of sandstone is lying in the farmyard at Pond Park, about two miles to the south-east of Felstead, and from this I have obtained several fragments of *Pecten orbicularis*; they were kindly examined for me by Mr. H. Keeping, Curator of the Woodwardian Museum at Cambridge, and he wrote me word to say that they were most probably from the Lower Greensand, corresponding to a bed in fig. 1 in his paper on the Lincolnshire Neocomian*. It would be an interesting question whether these blocks can possibly have come from the Lincolnshire beds. But the boulders of limestone are really of greater interest than the sandstone, as there are in them fossils in abundance, so that one can identify them with much greater certainty. Of these a considerable number are of a dark grey crystalline texture, one of them measuring as much as three feet by two feet six inches by two feet, and another two feet three inches by two feet by one foot three inches. They weather a light bluish grey, and are very hard. I have made some eighteen or twenty microscopic sections of these, and amid pieces of broken shell and stems of encrinites they contain some beautifully perfect specimens of the foraminifera, which are described and figured in Mr. Brady's well-known monograph of the Permian and Carboniferous Foraminifera. As a rule these crystalline blocks are of fine texture and abound in specimens of *Valvulina*, *Endothyra*, and *Trochammina*.

In addition to these hard crystalline blocks, there are others of a much looser texture. In the "Swan Inn" yard at Felstead there is a large boulder of soft limestone, measuring three feet by two feet six inches by two feet, which is very much weathered, the rain and frost having deeply wrinkled the sides: this is a glauconitic limestone, and doubtless belongs to the Greensand beds. But perhaps the most common are the boulders of Jurassic limestone, chiefly belonging to the Oxford and Kimmeridge Clay series. Of these, two very large boulders might have been seen a short time ago in the high banks of the railway cutting at Dunmow; they were sticking out at the bottom of the Chalky-boulder Clay, which covers the top of the cutting, extending down the surface some five or six feet in depth. Underneath this, just at its junction with some few inches of laminated clay which lie on the top of twelve feet or more of loamy gravel full of great flints, quartzites, etc., these two boulders were sticking out at a distance of sixty or seventy yards from one another. On examining them they were found to be Kimmeridge Clay, containing broken pieces of Ammonites, but they were deeply grooved with parallel striæ on all faces, more especially the block at the western end of the cutting. A friend took a photograph for me of the eastern end of the cutting, shewing the block as it lay between the boulder clay and the laminated clays; but since then the cutting has been widened and the blocks have both been sacrificed to the needs of railway extension.

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* "Quarterly Journal Geological Society," May, 1882, "On Some Sections of Lincolnshire Neocomian." H. Keeping.

But besides these boulders, there are others of an entirely different character, consisting of igneous rocks. Of these I found one large boulder of an exceedingly hard porphyritic rock, smoothed and somewhat polished, but scarcely at all weathered, lying in a ditch in an out-of-the-way lane in the parish of Great Waltham. And at Little Saling there are two large blocks of dolerite, one lying near the churchyard and the other at Mr. J. Smith's farm. The latter measures roughly three feet by three feet by one foot four inches; it was dug out of a ditch on the farm not long ago, and was transferred to the farm-yard; it is exceedingly hard and very close grained, yet it is smoothly polished and very clearly striated on one side. The microscopic sections of these show that they are sub-ophitic dolerites, the one near the church containing olivine in abundance, sharp and clear, with not much augite, and the other containing no olivine, but augite in abundance in granular aggregates.

It must always be a very interesting question as to where these boulders came from. There can be no doubt that they were brought by ice, in the glacial periods, whether land ice or icebergs, and also very little doubt that they came from a northerly direction. It is possible that the Carboniferous limestone may have come from the Pennine range, and the Jurassic limestones from Yorkshire, and that the porphyrites and dolerites are from Scotland, or perhaps more probably from Scandinavia, but until some more definite evidence can be obtained, it is impossible to speak with any certainty upon such an exceedingly difficult question.

Essex Heronies.—In the fourth edition of Yarrell's "British Birds," edited by Mr. Howard Saunders, F.L.S., is given the following list of Essex Heronies (vol. iv. (1885), p. 165):—Wanstead Park; Sir John Tyrrell's, near Chelmsford; Chest Wood, Layer de la Haye (nearly 100 nests in 1877); and St. Osyth Priory. We shall be glad to have any information about these heronies, or others unrecorded, for publication in the ESSEX NATURALIST.—ED.

THE "ESSEX EMERALD" MOTH.

(*PHOROSDESMA SMARAGDARIA, Fb.*)

It is a matter of common observation with those interested in field natural history that oftentimes species presumed to be rare, become common in collections as soon as their precise localities and habits are known. More particularly is this the case in entomology. Many insects lead such retired lives, and have so many and unexpected methods of concealment, that a collector ignorant of the habits of the species he is in search of, may pass whole days in its special locality, and perhaps meet with one or two chance specimens only, the while a brother collector, more knowing in the ways of his prey, will have filled his bottles or boxes in a few hours.

The pretty insect, *Phorosdesma smaragdaria*, was for many years one of the rarest and most local moths in England, but since the discovery of the habits of the larva, the species bids fair to be soon represented by British examples in all good cabinets. The first recorded native specimen appears to have been that beautifully figured in Curtis's "British Entomology," vol. vii., pl. 300 (dated March, 1830), under the name of "*Hipparchus smaragdarius.*" Mr. Curtis remarked as follows :—

> "For the loan of this rare insect, which is unique as British, I am indebted to Mr. C. Parsons, of 'The Lawn,' Southchurch, Essex. Mr. Parsons found the caterpillar in that neighbourhood, and the moth was hatched the 30th June, 1826."

Stephens, in his "Illustrations of British Entomology" (vol. iii., Haustellata, p. 180), alludes to Curtis's figure, and states that he had never seen a specimen of the moth. Mr. Parson's specimen remained the sole British representative of the species until 1845, when Mr. J. W. Douglas and Mr. Haggar took five specimens "among grass on the sea-wall" at St. Osyth ("Zoologist," 1845, p. 1089). Mr. Howard Vaughan has kindly communicated to us the following extract from the Diary of the well-known collector, the late Mr. Bouchard :— "Jan. 20th, 1857.—A fine female *smaragdaria.* I think it ought to be got earlier near Leigh." The exact locality is not stated, but Mr. Vaughan suggests that it was Canvey Island, in the Thames estuary. He adds, "I have heard that the late Mr. Ingall once accidentally swept up a larva in Sheppey." In Stainton's "Manual" and in Noel Humphrey's "Genera of British Moths," *P. smaragdaria* is stated to have occurred at Southend, but no authority is given. Stainton gives a line of description of the larva from Freyer, and quotes from Koch as to its habit of covering itself with small pieces of vegetable matter as a mode of concealment, but the food-plant is not mentioned.

Judging from the price asked for the moth in Continental price lists, it is not very rare in many parts of Europe. In Staudinger's Catalogue (1871) the following localities are given :—Central and Southern Germany, England, South-Eastern France, Italy, Southern parts of Eastern Europe, Bithynia, Armeria, Siberia, Amoor, and the steppes of South-Eastern Russia. Mr. W. F. Kirby (to whom, and to Mr. Stainton, the Editor is indebted for some particulars as to the distribution of the moth) remarks, "It is clear that like many insects which have a wide range across central Asia-Europe (Siberia in Staudinger's Catalogue I fancy generally means the Altai), it becomes scarce towards the western extremity of its range." Frey (1880) records it as occurring in various localities in Switzerland to an elevation of 4,000 feet, so that like many species of insects and plants *(e.g., Papilio machaon* and *Primula elatior)* its Continental habitats differ from ours; the mountains of Switzerland, and some other localities mentioned, have little in common with the low estuarine shores which *P. smaragdaria* frequents in Essex.

In the "Entomologists' Monthly Magazine," vol. IX. (1872-3), p. 163, Mr. J. J. Walker mentions that in 1872 he picked up a beautifully fresh and perfect fore-wing of *P. smaragdaria* in the Dockyard at Sheerness; but in spite of a long search, he failed to find the "remainder of the insect, whose career had no doubt been cut short by some hungry bat." And in the same magazine, vol. X. (1873-4), p. 180, Mr. A. Hodgson records that on the evening of July 1st, 1873, "while mothing near Sheerness, I was fortunate enough to take a rather worn specimen of *Geometra smaragdaria*, which had settled on a grass stem."

The above are the only old notices of the occurrence of the moth we have hitherto met with. In late years various rumours were current in entomological circles as to its capture on the Essex coasts, but probably the first published intimation of this was that by Mr. George Elisha in the "Entomologist" (vol. xvii., p. 235), dated September 18th, 1884. Mr. Elisha (who withheld for a time the exact locality and food plant) stating that Mr. Machin had discovered the larva in

Essex some few years before, but had kept the matter secret, gave the following account of his own independent observations:—

> "While collecting micro-larvæ on the Essex salt-marshes last week, I took one larva of the rarity, *Geometra smaragdaria*, from a plant on which I should never have thought of looking for the species, and though I had never seen the larva before, and was not even thinking of it at the time, I knew in a moment what it was, from its being covered all over with small pieces of leaves and scaly portions of its food-plants, reminding me of the larva of *Phorosdesma bajularia*. I certainly should not have seen it had it not stretched itself out and waved its head to and fro with a tremulous motion; for its mimicry of dead portions of its food-plant is so perfect that it took me some little time to find it after I got home, although there were only a few small pieces of the plant in the box. It is now three years since I first went after this larva, and many long and fruitless journeys I have had since that time, extending over miles of ground in every direction on the salterns. Year after year I was searching the wrong plants; for although I worked up the subject as well as possible by all the books that contained any information about the species, the knowledge I gained was quite useless as regards its food, so that my journeys always ended in disappointment. They were not, however, altogether unprofitable, for I have added a great number of very local species to my collection, from larvæ taken in the district, which I certainly should never have found had it not been *Geometra smaragdaria* which first induced me to collect over such a very uninviting and desolate looking locality."

At the meeting of the South London Entomological Society, on September 17th, 1885, Mr. Elisha exhibited *P. smaragdaria* "from larvæ taken in the Essex salt marshes."

In the "Entomologist," vol. xix. (1886) p. 211, Mr. H. Jobson, of Walthamstow, records breeding a "splendid series of *P. smaragdaria*, the larva of which I found on the Essex coast last autumn"—and on the same page Mr. J. A. Cooper, of Leytonstone, says:—"From larvæ I collected on the Essex salt marshes last autumn, I am now breeding a fine series of *P. smaragdaria*. The species appears to be well distributed along the Essex side of the mouth of the Thames." Mr. Cooper has kindly favoured the editor with the following more detailed observations under date, January 13th, 1887:—

> "I was pleased to breed a fine series of this beautiful species last season from larvæ I collected on the salterns on the Essex side of the Thames during the preceding autumn. The larvæ were found in the months of October and November, feeding in cases made of their food plant, and they hybernated on dead stems, etc. The larvæ recommenced feeding in early spring, and grew to full size rather quickly. When full fed they present a very curious appearance as the cases are then composed of pieces of the food plant, and are a good inch in length. In confinement I noticed one individual had attached to its case a piece of paper and a long thread hanging from the muslin cover of the breeding cage. The larvæ pupated in a slight web, spun amongst the food plant or any convenient herbage near. The perfect insect emerges in July, but I was unable to meet with it at large, as owing to its sluggish habits it is difficult to dislodge from its place of concealment. One curious and interesting fact in the life history of this species is that some of the larvæ found must at times have been submerged by the tide, and while walking along a bank this winter, from which I had collected larvæ, I noticed the line of drift left by the last tide was considerably above where the food plant grew."

In the "Proceedings of the South London Entomological Society" August 19th, 1886, it is noted that Mr. Cooper and Mr. Jobson exhibited specimens, and figures of the larva at rest and extended are given. In Lord Walsingham's magnificent collection of the larvæ of Lepidoptera now in the Museum of Natural History at South Kensington, are four larvæ taken in Essex, 11th June, 1884.

In none of the above notes were any descriptions of the larva given, nor was the food-plant mentioned. For information on these points entomologists are indebted to Mr. George Elisha, who has given a very complete "life history" of the moth in the "Trans. Entomological Society of London" for 1886, p. 465. The author found the caterpillars on the Sea-Wormwood (*Artemesia maritima*, *L.*) which is so common a plant on the "saltings," and he has detected the insect in many places on the Essex coast over an extent of ground at least thirty miles in length; indeed he is of opinion that it will be found anywhere along this coast where the sea-wormwood grows. The eggs are laid in July on the upper shoots and leaves of the *Artemesia*, and, on hatching, the young larvæ immediately cover themselves with the cottony down of the plant, so looking like little balls of white wool. Mr. Elisha has kindly permitted us to extract the following details from his valuable paper :—

"The larvæ during the whole of their existence keep the body in an arched position, except when feeding, when they stretch themselves out a little; but on the slightest alarm they again assume the curved position, with the anal claspers fixed to the plant, and the prolegs drawn up close to their bodies. As the larva increases in size it increases the length of the morsels of the food-plant it attaches [by means of some glutinous secretion] to its body which on some adult larvæ are often three-quarters of an inch in length. When the pieces are first attached to the body they are, of course, green and fresh, but they soon become discoloured, and in a few days are withered and brown; then the larvæ, in their curved position, so exactly resemble the dead shoots of their food-plant that they are extremely difficult to detect, unless some movement betrays them, or one is familiar with their peculiar appearance. Thus it is evident that the object of the larvæ in attaching these pieces to their bodies is for the purpose of protection against their numerous enemies.

The larvæ continue feeding till about the end of October, by which time they have attained the length of one-half to three-quarters of an inch, after which they fix themselves to the food-plant, and remain motionless during the winter months. With the first warm days of spring, towards the end of February, they begin moving; and about the first week of March, when *Artemesia maritima* is again appearing above the ground, they commence feeding, soon after which they moult and again cover themselves with pieces of the food-plant, which, being now green and fresh, give them a healthy appearance. About the middle of June they are full-grown, when they rest for a day or two, and then spin a loose network cocoon; (this they form by drawing together, with silken threads, the pieces of the *Artemesia* that are thickly adhering to their bodies, into an oval-shaped covering attached to the stem of the food-plant), and in it they change to a greyish pupa, with the striped wing-cases showing very distinctly.

"The larva, when full-fed, is about an inch and a quarter long, of a dirty greyish colour, with darker lines along the body, the skin very rough, and the head and legs brown; but, owing to its being covered so entirely with the dead and brown portions of the food-plant, it is extremely difficult to make out the exact markings. It sometimes feeds at dusk, but more frequently during the morning sunshine, and at times, when the sun is hot, it eats most voraciously, appearing to be in a very excited state during the whole time the sun is shining upon it. This necessity for sunshine constitutes one of the many difficulties the collector has to contend with in rearing these larvæ, for the sun is, of course, a great obstacle to keeping the food fresh. The only way to keep the food comparatively fresh is to dig up the *Artemesia* with a large clod of earth, so as not to disturb the roots, and even then it rarely keeps longer than a week. To be successful therefore with these larvæ a great deal of trouble must be undergone.

"The perfect insects appear about the middle of July, generally during the early morning, and remain motionless the whole of the first day; and I believe until daybreak of the next, for I have looked at them as late as twelve o'clock at night, and found them still motionless; but, on again looking at them about seven o'clock on the following morning, some had paired, remaining *in copulâ* during the whole of that day, but parting towards the evening. By the following morning the females had commenced depositing *ova*, and continued to do so for four or five days, each laying about 150 eggs altogether, and some more."

Mr. Elisha is of opinion that the explanation of the apparent rarity of this insect is to be found in the sluggish nature of the perfect insect, which keeps concealed among the *Artemesia*, and so escapes the sharp eyes of the entomologist. The moth seldom moves unless disturbed, and then will generally drop to the ground and remain motionless; but after pairing the male becomes more active, and will fly about if touched, and soon gets damaged.

The "Essex Emerald" is a species of such great interest to all local naturalists, and indeed appears in England to be almost entirely confined to our county (if we except the Isle of Sheppey captures mentioned above) that we make no apology for printing the foregoing summary of its occurrences and habits. We shall be glad to have any further records or observations from entomologists who may have met with the insect.—Ed.

There were Giants in those Days.—"From hence the shore shooting out, buncheth foorth as farre as to the Promontorie *Nesse* [Walton-Naze], which, in the English-Saxon tongue, is called Eadulphesness. What hath been found in this place, have heere out of the words and credit of *Ralphe*, the Monke of Coggeshall, who wrot 350 yeeres agoe. *In King Richard's time, on the Seashore, at a village called Eadulphnesse, were found two teeth of a certaine Giant, of such a huge bignesse, that two hundred such teeth as men have now a daies might be cut out of them. These I saw at Coggeshal* (quoth he) *and not without wondering.* And such another Giantlike thing (I wot not what) as this, was in the beginning of Queene Elizabethe's raigne digged up by *R. Candish*, a gentleman, neere unto this place. Neither doe I denie, but there have beene men, that for their huge bodies, and firme strength were wondrous to behold: whom God, as *S. Austin* saith, would have to live upon the earth, thereby to teach us, that neither *beauty of body, nor talnesee of stature, are to be counted simply good things, seeing they be common as well to infidels as to the godly.* Yet may we very well thinke, that which *Suetonius* hath written, namely, that the huge limmes of monstrous Sea-creatures else where and in this kingdome also, were commonly said and taken to have beene Giants' bones."—Camden's "Britannia" (1610).

"PRIMÆVAL MAN IN THE VALLEY OF THE LEA." (*Conclusion.*)

BY WORTHINGTON G. SMITH, F.L.S., M.A.I., etc.

IMPLEMENTS.

NEARLY all the Palæolithic Implements found in England are made of flint: in the cherty gravels of Dorset, Somerset, and Devon they are, however, made of chert. On very rare occasions a Thames Valley implement is made of quartzite. I have seen a few flakes of quartzite in the Stoke Newington gravels, but as far as I know only one implement of this intractable material has been met with there. This was formerly No. 1,317 in my collection, and is now in the British Museum, Bloomsbury; it is a very good example, weighs 13 ozs., is made of compact quartzite, and is illustrated one-half its actual size fig. 1. Why Palæolithic men now and then made quartzite implements in positions where flint was abundant, is hard to say, they were possibly made for amusement, or as proofs of unusual skill and dexterity, they were certainly not made from necessity, for their manufacture was very much more difficult than in the ordinary tools of flint.

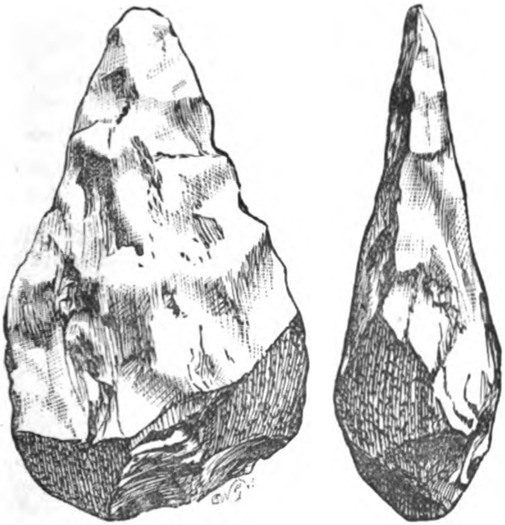

Fig. 1.—Palæolithic Implement of compact quartzite from Creighton Road, Stoke Newington (one-half actual size).

The curious flint implement of aberrant form illustrated, one-half its actual size, in fig. 2, was found on the "Palæolithic Floor" at Shacklewell, and is now in the British Museum, Bloomsbury. It belongs to the keen and unabraded class, and is made from a block of flint, which exhibits a deep natural depression on one edge; this depression was at first a large natural hole. The implement is beautifully made, and shows the work of a skilled and experienced implement maker, but why a good workman should have used such a defective and unsuitable piece of stone to work upon, is difficult to imagine. The man or woman probably made the tool out of sheer wilfulness. When made it must have excited curiosity, and possibly some little mirth or even horse-play amongst the companions of the maker.

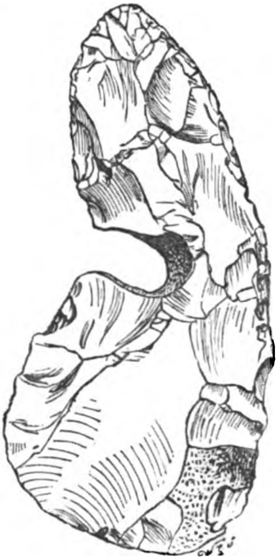

Fig. 2.—Aberrant form of Palæolithic Implement from Shacklewell (one-half actual size).

One of the smallest of the Stoke Newington Implements was found by Mr. G. T. Lawrence, in the trimmed flake illustrated in fig. 3; this example weighs less than half an ounce. Some of these small tools resemble arrow, spear, and lance heads, but I greatly doubt whether any such weapons were known to Palæolithic men. Our Palæolithic precursors spoilt many of their implements in the course of manufacture. On the

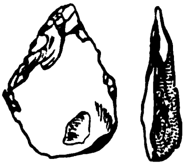

Fig. 3.—Unusually small Palæolithic Implement from Stoke Newington (one-half actual size).

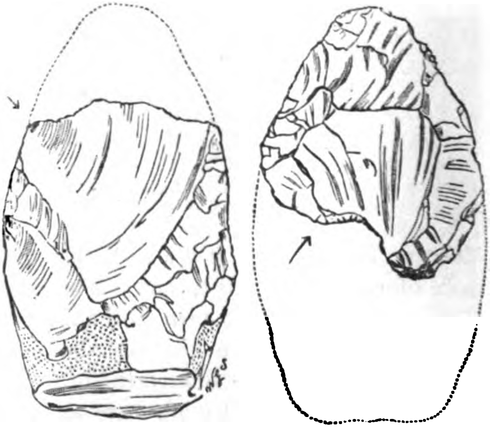

Fig. 4.—Butt and front of Palæolithic Implements from Stoke Newington, broken in the course of manufacture (one-half actual size).

"Palæolithic Floor" at Stoke Newington, half finished and spoilt and broken implements are common. Sometimes an unfortunate blow from the punch has ruined the form of the point; at other times an awkward piece has been detached from the butt, and so spoilt the form of the base of the tool. In fig. 4, a butt end is shown on the left and a point on the right. In both instances an implement has been ruined by an unskilful stroke, perhaps aided by a flaw in the flint. The two pieces illustrated belong to different implements, and the direction of the blow which caused ruin is shown by the

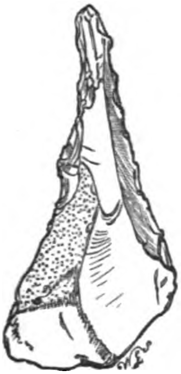

Fig. 5.—Boring tool from Hanwell (one-half actual size).

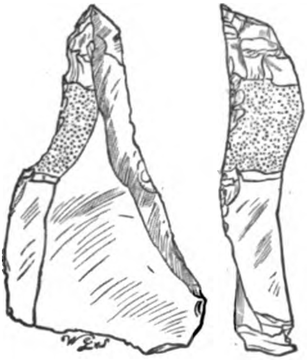

Fig. 6.—Boring tool from Little Thurrock (one-half actual size).

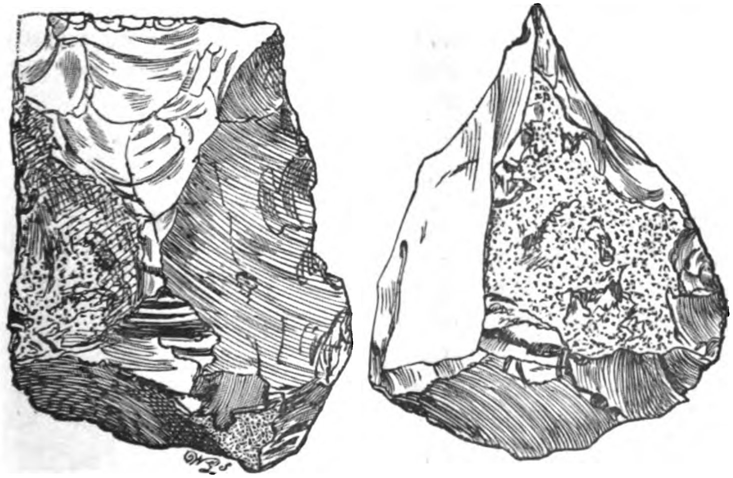

Fig. 7.—Massive Wedge from Stoke Newington (one-half actual size).

direction of the arrows. Point ends broken off by use from perfect implements in Palæolithic times are also extremely common, so of course are the butts. Some of the butts show by their condition that the implements were used as hammers or hammered as wedges, with heavy pebbles, into some other object or material. The butts and umbos were often used for hammering.

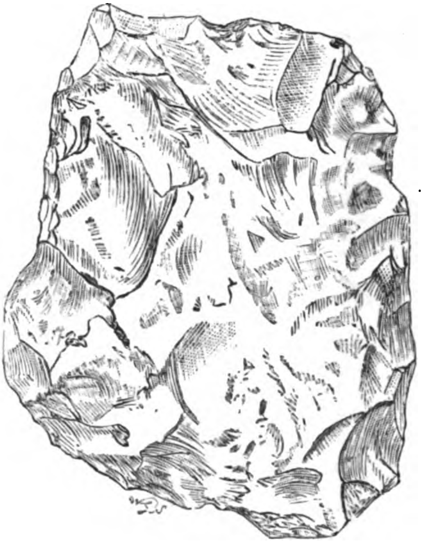

Fig. 8.—Wedge from Stoke Newington Common (one-half actual size).

Boring tools are often overlooked unless the examples are well made; an indifferent specimen from the Valley of the Thames at Hanwell is illustrated, one-half actual size, in fig. 5. A better and more keenly pointed example is shown, one-half actual size, in fig. 6; this specimen was found at Little Thurrock, by Mr. Sidney Robarts, a member of the Essex Field Club. I have much more distinct and highly finished boring tools in my collection.

Wedges are not uncommon. Two views of a massive wedge with a broad chisel edge and heavy butt is shown, one-half actual size, in fig. 7. Some wedges are much neater in design and execution than the one illustrated; as the example illustrated in fig. 8, now in the British Museum collection at Bloomsbury.

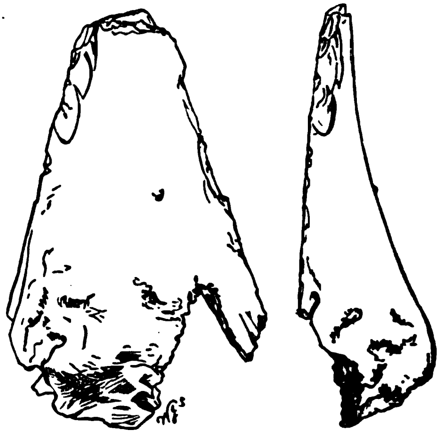

Fig. 9.—Implement-like form of fossil bone from Stoke Newington (one-half actual size).

Tools of fossil bone have never, as far as I am aware, been found

SUDBURY.

WORKS TO BE CONSULTED.

Geological Survey Map, *Sheet* 47, **Drift Edition. Memoir on the above** (Geology of the N.W. part of Essex, etc., 1878), in which the sections are described in detail. Price 3s. 6d. (Stanford's, Charing Cross.)

In the Memoir on the Geology of Ipswich, etc. (1884), there is a supplement on sections at Sudbury, p. 132, 133. (Stanford, price 2s.)

Marr, Geol. Mag., June, 1887, pp. 262—270.

Members going to Bury might usefully consult the Drift Edition of Geol. **Survey,** sheet 51, S.E., and the Memoir thereon, "The Geology of Bury St. Edmunds, etc.," price 1s.

About five o'clock the party will partake of a meat-tea at the "Rose and **Crown,"** (about 2s. 6d.) Return to London by the 6.29 train.

Those intending to join in the meeting should send their names to **Mr. T. V. HOLMES, 28, CROOMS HILL, GREENWICH PARK, S.E.** (who has kindly undertaken to act for the members of the Essex Field Club on this occasion), not ***later than July 6th***, in order that arrangements may be made with the Railway **Company.**

As some members may like to spend the next day (Sunday) at the interesting **town of Bury** St. Edmunds, Mr. Whitaker proposes to go on there by the 6.27 **train with those** who wish it. In order to make arrangements at Bury it is **essential that** members wishing to go there should send word to Mr. Whitaker (care of **Mr.** Holmes as above) *as soon as possible*, so that he may communicate with a **friend** on the spot. Probably rooms will be secured at the "Angel."

Reprints of this programme may be had, as well as any further information on **application.**

WILLIAM COLE,

Buckhurst Hill, Essex. *Hon. Secretary.*

Special Notice to Members.

The programme of the Field Meeting on July 9th will be found within on pages 2 and 3 of wrapper. Reprints of the programme for the use of those attending the meeting have been prepared, and copies may be had on application.

Announcements of other Field Meetings will be made by circular, or on the cover of the ESSEX NATURALIST for July.

The Mollusca of Epping Forest.—Special attention is directed to Mr. Harting's request for aid in drawing up a catalogue of the Mollusca of the forest, which will be found in the present number. Mr. Harting will probably give an address on the Habits of Mollusca, Methods of Collecting, etc., at an early meeting of the Club.

SUBSCRIPTIONS.

Subscriptions for 1887 *are now due*, and should be sent to the TREASURER, THOMAS ROYLE, Esq., "The Cedars," West Ham, Essex. POST OFFICE ORDERS should be made payable at STRATFORD, E., and Cheques crossed "London and County Bank," Stratford Branch.

It is particularly requested that Subscriptions *be not sent to the Secretary*, as that plan only occasions delay and extra work.

LIBRARY AND PUBLICATIONS.

It is requested that all enquiries respecting the Library, Books and Periodicals for the same, *and all orders for the Publications of the Club*, be sent to the LIBRARIANS at the HEAD-QUARTERS, 8, KNIGHTON VILLAS, BUCKHURST HILL, ESSEX. A full list of the Publications of the Club, with prices, etc., was given in the last number of the ESSEX NATURALIST.

THE ESSEX NATURALIST.

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Papers, notes, memoranda, &c., relating to the Natural History, Geology, and Pre-historic Archæology of Essex, will always be welcomed.

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OF THE

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EDITED BY

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Contents:

PAGE
"Primæval Man in the Valley of the Lea" (*Illustrated*) — By WORTHINGTON G. SMITH, F.L.S. (*Concluded*) 129
Obituary. — Rev. THOMAS BENSON, B.A.; LIEUT.-COL. C. RUSSELL, J.P., D.L.; Mr. E. G. VARENNE 138
Notes. — The Raven (*Corvus Corax*) — E. A. FITCH, F.L.S.; Essex Heronries — E. A. FITCH 142
Report of Field Meetings, Essex Field Club, June 18th and July 9th, 1887 (*with illustration*) 143
Notes. — Capture of a Large Trout in Cripsey Brook, Ongar — "Essex County Chronicle;" Section in a new Railway Cutting at Maldon — T. V. HOLMES, F.G.S.; Voracity of the Adder — R. W. CHRISTY; The Badger (*Meles taxus*) — E. A. FITCH; The Wild Duck (*Anas boscas*) — E. A. FITCH; Well-section at Roxwell, Essex — R. W. CHRISTY; Danewort or Dane's-blood — ED. 149
On a New British Alga (*Vaucheria Sphærospora*, Nordst.) **lately found near Maldon** — By E. M. HOLMES, F.L.S. 151
Note. — Gravel on Northey Island, near Maldon — T. V. HOLMES, F.G.S. 152

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in the Lea Valley, although the two views of a piece of fossil bone shown, one-half the actual size, in fig. 9, have a very distinct Palæolithic form, whilst the top end shows traces of splintering or flaking, which may, however, be accidental.

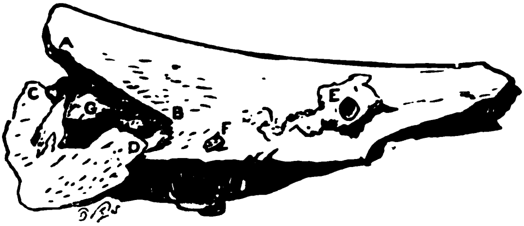

Fig. 10.—Piece of fossil antler, showing signs of hacking, from Little Thurrock (one-half actual size).

In fig. 10 is illustrated, one-half actual size, a fragment of a fossil antler of red deer (*Cervus elaphus, L.*), found by me *in situ*, with numerous other fragments of antlers, bones, tusks, and keen flakes and implements, on the "Palæolithic Floor," at Little Thurrock. It is interesting as distinctly showing (as I think), a fracture produced by the straight edge of a Palæolithic implement at A B. The blow has broken the antler, and the small piece broken off is seen at C D., not free, as it was in Palæolithic times, but naturally and firmly cemented by a ferruginous deposit into one mass with the larger piece; the fragment of antler is made more interesting by the presence of an impression in the hard ferruginous deposit at E of a shell of *Corbicula fluminalis*, Müll, a shell of a mollusc now extinct in Britain, abundantly found in a fossil state on the same "floor;" F is a fragment of antler naturally cemented; G is a hard cemented mass of ferruginous sand. The example itself is now in the BritishMuseum, Bloomsbury.

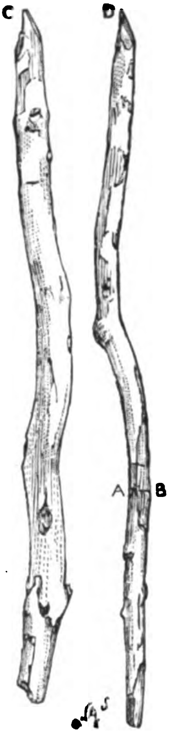

Fig. 11.—Two artificially-pointed Birch Stakes from Stoke Newington (scale, one inch to one foot).

It is probable that Palæolithic men used many tools made of wood, chiefly perhaps clubs for defence and attack, and stakes for supporting the roofs of rude huts. A great deal of wood has been met with on the "Palæolithic Floor," at Stoke Newington, chiefly branches, twigs, and tree trunks. Very little has been preserved, owing sometimes to the unwieldly size of the pieces, and at other times to their very friable nature; neither could room be found indoors, or out, for the tree limbs, etc., found. All wood has not become friable, some has remained exceeding firm. Leaves were in some places abundant, but in the highest degree friable and difficult of preservation; indeed I had no time, means or material for preserving all the vegetable remains. I recognized without doubt the alder, the hazel, the birch, blackthorn and brambles (with thorns *in situ* on the branches and twigs), rushes showing typical microscopical structure, grasses, Traveller's Joy (*Clematis vitalba, L.*), and in great abundance the rhizomes and fronds (especially the former) of the Fern Royal (*Osmunda regalis, L.*) In some places on the "floor" the fronds of the Fern Royal appeared to have been used as litter; in one mass shovelled out, for me by the men, I found, besides several sharp flakes, a keen and beautifully made little flint implement, and part of a fossil leg bone of a small horse. The implement is in the British Museum, Bloomsbury.

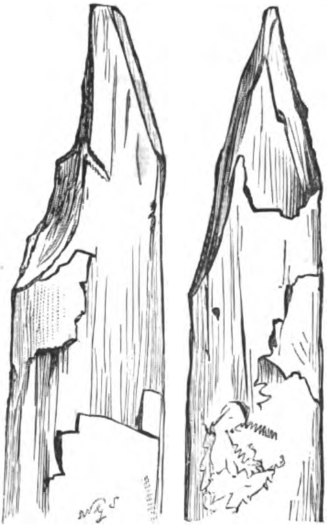
Fig. 12.—Ends of the stakes illustrated in Fig. 11 (one-half actual size).

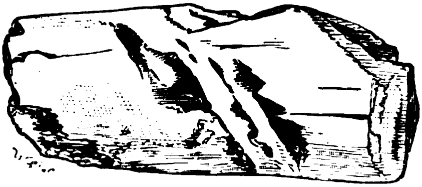
Fig. 13.—Piece of hacked wood (one-half actual size).

Amongst the fern fronds two artificially pointed birch stakes, each nearly four feet long were drawn out by the men, as illustrated, to the scale of one inch to a foot, in fig. 11. The stakes were so soft when found that one parted in two at A B when laid down. The two artificially hacked and pointed ends of these stakes are shown one-half actual size in fig. 12. A carefully executed full size drawing of these stakes was made by me directly they were found, and the accompanying illustrations have been photographically reproduced from the original sketches. On drying, the stakes became greatly shrivelled, twisted, and split, and the pointed ends hardly recognizable. However, they were sent in their shrunken and cracked condition with various other things to the British Museum, Bloomsbury. Another piece of wood from the same deposit is shown, one-half the actual size, in fig. 13. The hacking is seen on the face, and the right-hand end has been hacked off.

SECTIONS.

The "Palæolithic Floor" at north-east London, is generally on the top of the river gravel, and just beneath the "warp and trail." Its position will be seen indicated on the accompanying section, fig. 14, drawn to a horizontal scale of two inches to the mile, and a vertical scale of 100 feet to one inch. It is taken looking north, from Stoke Newington Common, Middlesex, on the west; to the south of Walnut Tree House, and so to Moyer's Lane, Leyton, Essex, on the east.

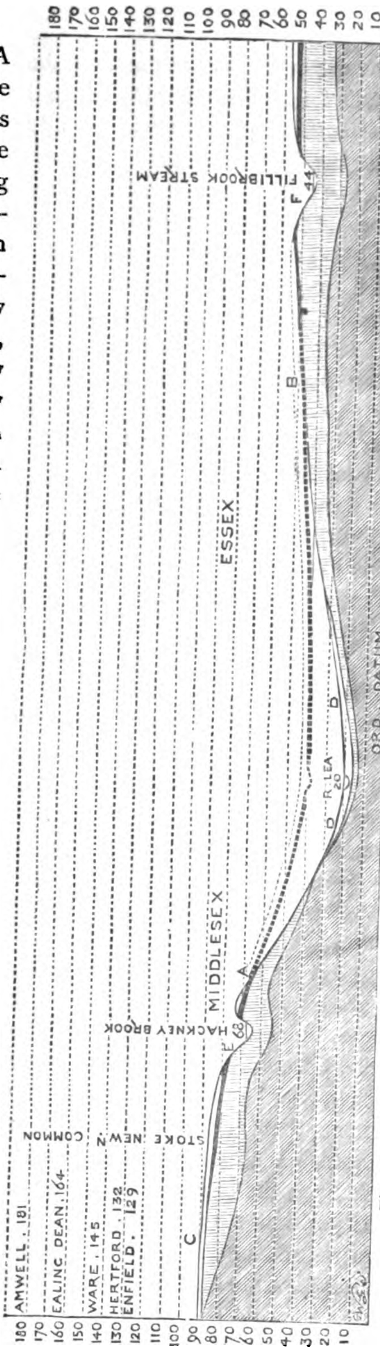

Fig. 14.—Section through the Valley of the Lea, showing probable position of "Palæolithic Floor" prior to the deep excavation of Valley.

The extreme left of the section shows Stoke Newington Common, eighty-five feet above the Ordnance datum (with the Hackney Brook, whose surface before it was recently obliterated, was sixty-eight feet above the Ordnance datum), dropping into the Lea Valley, the surface of the river on this line being twenty feet above the Ordnance datum. On the right the section gradually rises to the Leyton side of the Lea, crossing the Fillibrook stream. The stream at this part (which, too, will soon be obliterated), is forty-four feet above the Ordnance datum, and the adjoining Moyer's Lane is fifty-six feet.

The diagonal shading at the bottom of the section shows the London clay; the vertical shading above indicates the gravel. The heavy black line on the top of the gravel shows the line of the "Palæolithic Floor" on both sides of the Lea, and the uppermost line shows the line of "warp and trail," surmounted by humus. Undoubtedly the "Palæolithic Floor," and the "warp and trail" at one time extended right over the Valley of the Lea, as indicated by the heavy dotted line and the fine line above. At the time when the Palæolithic men lived on this "floor," the river was probably some twenty feet higher than now, as shown on dotted lines above "R. Lea"; the valley at that time, therefore, was much flatter and more marshy, and being flat, the river of necessity was constantly changing its bed. The excavation of the last twenty feet of the Lea Valley has been made since the "warp and trail" was deposited over the "Palæolithic Floor." Very little denudation has, however, taken place in recent times; for Roman remains and even Neolithic Celts have been found in the alluvial flats at D D.

At the points A and B, the "warp and trail" has been denuded off the "Palæolithic Floor," and at these special points the "floor" crops up on the surface. At these positions, therefore, perfectly unabraded Palæolithic implements and flakes (which have never been moved, unless in agricultural operations), may be found on the surface as the Palæolithic implements of chert are now found at Bois du Rocher, near Dinan, in Brittany. It must, therefore, never be too hastily assumed that because Palæolithic implements are sometimes found in an unabraded state on a modern land surface, that they were actually made upon the humus as we now see it. The surroundings of every such position should be carefully noted. At the point C, and at other well defined distant points from the Lea and Thames, the thin stratum identified as the "Palæolithic Floor" ceases. The men had good and obvious reasons for keeping within a moderate distance of the streams.

The "Palæolithic Floor" on the Essex side of the Lea has been, to a very great extent, pushed away by the advancing "warp and trail," or denuded away since Palæolithic times. At present I have only seen it on the east side of Leyton Street, and near "Walnut Tree House." On the Middlesex side of the Lea the "floor" is of great extent. I have seen it at London Fields, and south of and at Kingsland, and it exists in some parts of Fleet Street, Drury Lane, Gray's Inn Lane, and Clerkenwell, at about seventy feet above the Ordnance datum. It is well seen at Highbury, whence the first implement was obtained by Mr. Norman Evans; at Shacklewell, South Hornsey, some parts of Abney Park Cemetery, and Stoke Newington Common. I, however, have seen traces of it on many other surrounding places, and I believe, in short, it extended over the whole of East Middlesex by the Lea, into Herts as far as Hertford, Ware, and Wheathampstead, and on both sides of the Thames from London to the Nore.

It is a curious fact that the superimposed "warp and trail" is also implementiferous; the implements in this material are all more or less abraded, some very much so, and many are whitish or mottled in colour from long contact with the tenacious clay, and these latter implements have been brought from the north, from the lower gravels in the neighbourhood of Amwell, Ware, Hertford, Bush Hill Park, and Forty Hill, Enfield, and deposited at North-east London, over the Palæolithic Floor. At Ealing Dean certain of the implements have been carried down into the valley from the heights to the north of 164 feet.

When the Shacklewell gravel was originally referred to by Mr. John Evans ("Ancient Stone Implements," p. 523), he wrote that it rested on the slopes of the Hackney Brook, and from the knowledge of its position to be obtained at that time, he was quite justified in the supposition. When I first found implements in the sand close to this brook, I too thought that the implements really belonged to its valley. But when at last the brook was quite obliterated and builders dug foundations for houses in the middle of its bed, it was clear that the brook had nothing whatever to do with the Lea and Thames gravel at this place, but had merely excavated its way through it. On a section being made through the brook, the "Palæolithic Floor" was seen in section on both sides as at E, fig. 14. I have seen a similar section through the Fillibrook stream on the other side of the Lea in Essex as at F on the same illustration. These brooks and streams, although they possibly follow some very ancient depression in the London Clay beneath, are quite modern in comparision with the age of the "Palæolithic Floor" and its implements.

It is not a little curious that although our existing brooks are of comparatively modern date, yet it has not been uncommon at north-east London to see sections exposed of brooks of Palæolithic age: these ancient brooks became filled in with sand, and then covered by "warp and trail" at the close of the Palæolithic period. An experienced eye can point out the probable position of the beds of such obliterated underground brooks at the present day, by noticing certain slight continuous depressions in the present ground surface.

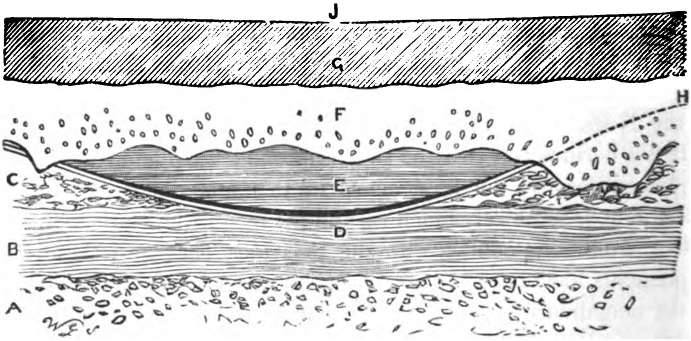

Fig. 15.—Section through bed of a brook of Palæolithic age, filled with stratified sand, and covered with "warp and trail."

An underground bed of a Palæolithic brook exists in Bayston Road, close to West Hackney Church, Stoke Newington High Street. At the present day it may be seen that the houses in Bayston Road very gradually descend from both ends of the road to a very slight depression in the middle, and this slight depression in the road answers to the bed of an obliterated Palæolithic brook beneath.

The section in fig. 15 is engraved to the scale of one-sixth of an inch to the foot, copied from an excavation made in 1883, at the south of Tyssen Road, and immediately on the west of Bayston Road; at the base of the illustration at A B C, different strata of implementiferous gravel and sand occur; at D the bottom of an obliterated Palæolithic brook is shown; the stratum at the bottom of the brook is deep red sand, derived from the red gravel at D; whilst the narrow black seam which is superimposed is London clay incorporated with sand; the bed of the brook at E is filled with fine sand, stratified and perfectly horizontal. Above this, at F, is "warp and trail"; and at the top at G, surface humus. It will be noticed that the "warp and trail" has ploughed its way through the brook and its banks, which brook had been previously filled up with fine sand. A few yards off, in the direction of H, the bank of the brook was again exposed, untouched by "warp and trail," and on this bank a beautiful unabraded Palæolithic implement was found, with numerous keen-edged flakes. The point J, is the lowest point in the Bayston Road to this day. At this point the London clay is about twenty-seven feet from the surface.

London clay comes to the surface close by towards the north-west. Nothing is more common than to see seams and rolled blocks of this clay in the sand and gravel, and also in the "warp and trail;" sometimes implements and flakes and vegetable remains may be seen sticking in this transported clay.

Fossil Shells.

In my paper published in vol. iii. of the "Transactions of the Essex Field Club," p. 119, I enumerated 16 species of fossil shells then known to me as belonging to the Lea Valley: since that time I have detected 29 others, making 45 in all.

List of the fossil-shells of land and fresh water molluscs found in the Palæolithic sand of north-east London.

1. *Corbicula fluminalis*, Müll.
2. *Sphærium corneum*, Linn.
3. *Pisidium amnicum*, Müll.
4. ,, *fontinale*, Drap.; var. *henslowana*, Jeff.; var. *pulchella*, Jeff.
5. ,, *pusillum*, Gmelin.
6. *Unio tumidus*, Phil.
7. ,, *pictorum*, Linn.
8. *Bythinia tentaculata*, Linn.
9. *Hydrobia marginata*, Mich^h.
10. *Valvata piscinalis*, Müll; var. *subcylindrica*, Jeff.
11. ,, *cristata*, Müll.
12. *Planorbis nitidus*, Müll.
13. ,, *nautileus*, Linn.
14. ,, *albus*, Müll.
15. ,, *marginatus*, Drap.
16. ,, *glaber*, Jeff.
17. ,, *spirorbis*, Müll.
18. ,, *carinatus*, Müll.
19. ,, *complanatus*, Linn.
20. ,, *contortus*, Linn.
21. *Limnæa peregra*, Müll.
22. *Limnæa auricularia*, Linn.
23. ,, *stagnalis*, Linn.
24. ,, *palustris*, Müll
25. ,, *truncatula*, Müll.
26. ,, *glabra*, Müll.
27. *Ancylus fluviatilis*, Müll.
28. ,, *lacustris*, Linn.
29. *Succinea putris*, Linn.
30. *Zonites radiatulus*, Ald.
31. ,, *nitidus*, Müll.
32. ,, *crystallinus*, Müll.
33. *Helix aculeata*, Müll.
34. ,, *nemoralis*, Linn.
35. ,, *arbustorum*, Linn.
36. ,, *rufescens*, Penn.
37. ,, *concinna*, Jeff.
38. ,, *hispida (?)*, Linn.
39. ,, *pulchella*, Müll.
40. *Pupa umbilicata*, Drap.
41. ,, *marginata*, Drap.
42. *Clausilia biplicata*, Mont.
43. *Cochlicopa lubrica*, Müll.
44. *Achatina acicula*, Müll.
45. *Carychium minimum*, Müll.

List of the larger animals whose fossil remains have been found in the Thames valley gravels, sands, and brick earths north of London.

1. Lion, *Felis spelæa*, Goldf.
2. Wild Cat, *Felis catus ferus*, Linn.
3. Hyæna, *Hyæna crocuta*, Zimm; var. *spelæa*, Goldf.
4. Wolf, *Canis lupus*, Linn.
5. Fox, *Canis vulpes*, Linn.
6. Brown Bear, *Ursus arctos*, Linn.
7. Grisly Bear, *Ursus ferox*, Linn. and C.
8. Otter, *Lutra vulgaris*, Erxl.
9. Mammoth, *Elephas primigenius*, Bl.
10. Straight-tusked Elephant, *Elephas antiquus*, Falc.
11. Horse, *Equus caballus*, Linn.
12. Big-nosed Rhinoceros, *Rhinoceros megarhinus*, Chr.
13. Small-nosed Rhinoceros, *Rhinoceros leptorhinus*, Owen.
14. Wooly Rhinoceros, *Rhinoceros tichorhinus*, Cuv.
15. Wild Boar, *Sus scrofa ferox*, L.
16. Hippoputamus, *Hippopotamus major*, Cuv.
17. Stag, *Cervus elaphus*, Linn.
18. Roe, *Cervus capreolus*, Linn.
19. Reindeer, *Cervus tarandus*, Linn.
20. Irish Elk, *Megaceros hibernicus*, Owen.
21. Urus, *Bos primigenius*, Boj.
22. Bison, *Bison priscus*, Boj.
23. Beaver, *Castor europæus*, Owen.
24. Water Vole, *Arvicola amphibia*, Owen.

The bones of man have not at present been certainly found in the Palæolithic deposits of the Thames valley; man is only known to have lived in company with the animals above enumerated by his works in the shape of the well-known and beautifully made implements of stone.

A fragment of human skull (see ESSEX NATURALIST, p. 45 *ante*) has, however, been found near the northern border of Essex, 7½ feet in brick earth, by the side of the high road from Bury St. Edmunds to Saxham, in Suffolk. The discovery was made by Mr. Henry Prigg, M.A.I., and is recorded on the "Journal of the Anthropological Institute" vol. xiv., p. 51 (1884—5). Mr. Prigg says he thinks there can be no question as to the great antiquity of the fragment, and that the deposit of red loam in which it was found must have been formed long anterior to the complete excavation of the valley of the Linnet to the south. It was found in a "pocket" eroded in the chalk. In adjoining "pockets" two grinders of the Mammoth were found, and four Palæolithic implements. By the courtesy of Mr. Prigg, I am enabled to print an illustration of the skull fragment (fig. 16) engraved one-half the actual size from nature by myself. It consists of a portion of a frontal bone, about five inches of the coronal suture, and a little over two inches of the sagittal with the anterior third of the left parietal, and a small portion of the right. The thickest part of the bone is three-tenths of an inch. Mr. Prigg considers the fragment to have belonged to "an undersized, poorly-developed individual of middle age, probably of the female sex."

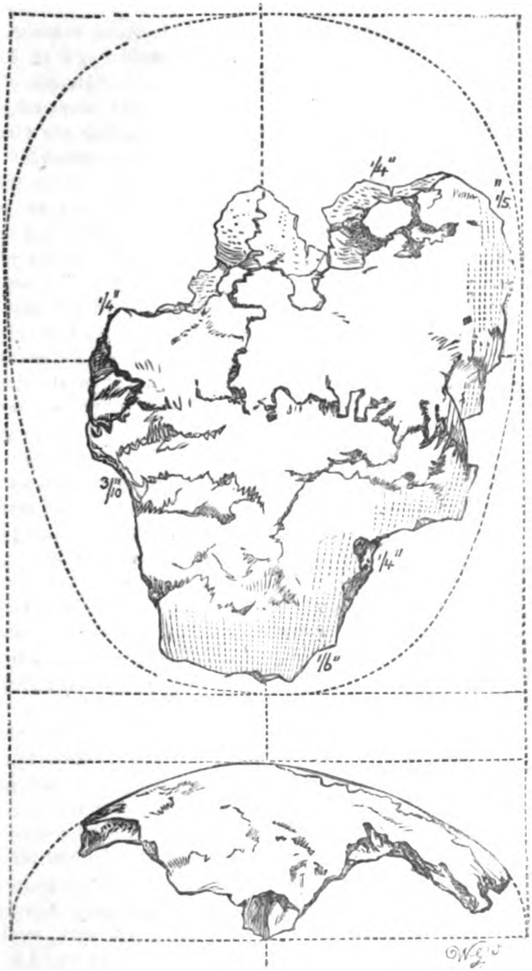

Fig. 16.—Fragment of human skull of supposed Palæolithic age, found near Bury St. Edmund's (one-half actual size).

[We have to thank Mr. Smith for the whole of the illustrations in the foregoing paper.—Ed.]

OBITUARY.

Rev. Thomas Benson, B.A.

We much regret to announce the death of this able Essex botanist. He passed away very quietly on June 9th, 1887, at the advanced age of 84. Thomas Benson was the son of the Rev. John Benson, St. Helens, Cockermouth, Cumberland, and was born in October, 1802. He was educated at St. John's College, Cambridge, and took his degree in 1824, obtaining the place of a Senior Optime in the Mathematical Tripos. He was at first intended for the Bar, and was at the Temple two years, contemporaneously with his uncle, the late Canon Benson, Master of the Temple. His father was most energetic in forwarding Henry Brougham's election for the county of York in 1830, and himself spent £20,000 thereon; Brougham's immense reputation and popularity prevailed, and upon election he was included in the Reform ministry, and at length accepted the Chancellorship with a peerage. He presented his friend's son Thomas, but lately ordained, to the vacant living of North Fambridge, Essex, in 1832—a by no means promising prospect for an accomplished and affable young man. The parish was small and out-of-the-way, with a population of less than two hundred; a very small old church, no parsonage, and a stipend of under £300. Here his life proved very uneventful, he lived almost entirely with his few people and in his botanical studies. He was a great walker in his young days, and never left home without his botanical book and box. Two or three times a week he would walk to Baddow, Danbury, and Chelmsford, to Maldon, or would cross the Crouch into Rochford Hundred, in search of plants; if he heard of a rare one occurring, no distance was too great for him to go in search of it. Fortunately, Mr. George Stacey Gibson went to see him when the "Flora of Essex" was in preparation, and thus some of the imformation he possessed is chronicled; Henry Ibbotson also visited him, and collected for Mr. Gibson in localities which Benson pointed out. Of the 1070 species occurring in Gibson's "Flora," Benson found 643 in Essex, exclusive of the forms of *Ranunculus aquatilis*, and the species of *Rubus*, *Salix*, *Carex*, and *Chara*.

Owing to local circumstances, to which this is not the place to refer, his new rectory was built three quarters of a mile from a bye road, half a mile from his church as the crow flies, but a good four and a half miles by road, on a piece of cold, wet, heavy land, and even in these latter days was visited by the postmen and the butcher but once a week. But what in 1830 was a fallow field, became in 1880 far and away the prettiest garden in the neighbourhood. It was only four or five years ago that we visited it, and it was delightful to hear the once energetic gardener—already entirely crippled and nailed to his chair by rheumatism and paralysis, blind with his left eye, with the other very weak, in itself a serious affliction to so voracious a reader—refer to his stock of fine shrubs and flowers, many of which it was really difficult to believe he had planted. He would call one's attention to many noteworthy specimens, and detail their history and parentage or the peculiar treatment they had received. Mr. Benson was liberal to a fault in matters of opinion, and has long been loved and respected by his small band of parishioners (the population of North Fambridge in 1881 was only one hundred and forty-two) and indeed by all who knew him. It is much to be regretted that his stores of local botanical and antiquarian information have died with him. On occasions when we have read to him some of our

Field Club's publications, he has lamented that his infirmities (albeit borne with patience and contentment) prevented his taking part in the work of the society, and the fact that some such body was not in existence thirty years ago when he was an active man, and would have taken great interest in its proceedings; his words were "There is nobody in this neighbourhood who cares for, or has any knowledge of the things you take up."

Mr. Benson leaves an only daughter, Mrs. Sidney Thorp, of Sible Hedingham, who is in possession of his herbarium, which would doubtless well repay a careful examination. The publication of the following notes from his annotated copy of Gibson's "Flora" may be useful:—

Adonis autumnalis, L. Amongst wheat, North Fambridge, 1874.

Nymphæa alba, L. The authority given in Gibson's "Flora of Essex," page 12, l. 25, "B," is not Mr. Benson's.

Corydalis lutea, D.C. Garden walls, Sible Hedingham; not wild.

Barbarea præcox, R. Br. Stow Maries and Danbury, but in both stations a palpable escape.

Sisymbrium sophia, L. North Fambridge; not seen for many years, 1863.

Senebiera didyma, Pers. Observed about Danbury Common for 36 years, 1868; first found in 1832.

Lychnis diurna, Sibth. In Dengie Hundred *much* more common than *L. vespertina*.

Melilotus vulgaris, Willd. Once as a weed in my garden.

Trifolium ochroleucum, L, and *T. arvense*, L. Both from Maplestead.

T. hybridum, L. North Fambridge, an escape from cultivation. Lane between Sible Hedingham and Great Maplestead, and apparently naturalized, 1865.

Lathyrus hirsutus, L. We pleased him by still finding this in his lane about five years ago.[*]

Hippuris vulgaris, L. Sible Hedingham.

Petroselinum sativum, Hoffm. Sible Hedingham, but cultivated in that neighbourhood for seed and probably an escape.

Crepis setosa, Hall. Clover Field, North Fambridge.

Lycium barbarum, L. Sible Hedingham.

Melampyrum arvense, L. One plant among tares, North Fambridge, 1863.

Euphorbia lathyrus, L. Stow Maries.

Juncus compressus, Jacq. "North Fambridge B," in Gibson, should refer to *J. gerardi*.

E. A. F.

LIEUTENANT-COLONEL CHAMPION RUSSELL, J.P., D.L., ETC.

THIS excellent Essex naturalist and sportsman died at his house, "Stubbers," North Ockendon, on Monday, May 16th, aged 66. He had been in ill-health since the beginning of the year, and in February he went for a trip in his yacht to Holland, but the change did not benefit him. When he returned early in March he was seriously ill, and was never able to leave his room again. Colonel

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[*] *July 14th*, 1887. Mr. W. H. Harwood and myself have just returned home from the sale of Mr. Benson's books, etc., at Fambridge. We could have gathered a good wheelbarrow load of *Lathyrus hirsutus*, if so minded; some in flower, but mostly in fruit. *L. nissolia* was common with it. Of butterflies the larvæ of *Euchloë cardamines* was present in his garden, and common on the charlock by the road side; several *Thecla W. album* were settled on the thistle heads by the side of Fambridge Hill Wood. The larvæ of *Eremobia ochroleuca* were conspicuous on a species of grass by the roadside, and many "nests" of the caterpillars of *Eriogaster lanestris* were noticed in the hedges. A female *Zeuzera pyrini* (*æsculi*) was found in the middle of the high road.—E. A. FITCH.

Russell was born on October 19th, 1820, and was the eldest son of the late Champion E. Branfill, of Upminster Hall. He assumed the name of Russell on succeeding to the estates of the late Joseph Russell. He married, in 1855, Emily Augusta, eldest daughter of the late Rev. C. Way, who survives him, and he leaves a somewhat numerous family. He is buried in the churchyard of North Ockendon, in which parish he was one of the principal land-owners. Colonel Russell took considerable interest in county affairs; was High Sheriff of Essex in 1858-9, and was for many years connected with the Militia and Volunteer forces. He joined the West Essex Militia, now the Fourth Battalion Essex Regiment, as a Captain in 1852. He was promoted to the rank of Major in 1855, to Hon. Lieut.-Colonel in 1880, and retired from the service in 1881 with the rank of Lieut.-Colonel. From 1860 to 1873 he was also Captain of the Romford Company of Rifle Volunteers, and only resigned when the order came into force which prevented any person from being connected with more than one branch of the Service at a time. From his earliest years persevering, painstaking and ambitious, he possessed a great amount of determination, and threw himself with zest into any subject to which he devoted his attention. He showed the vigour of his character at Cambridge by winning the Wingfield Sculls in 1846, thus becoming amateur champion sculler of the Thames. Colonel Russell was a very good chemist, and was most inventive and neat-fingered, always ready with contrivances for effecting any purpose in hand. In 1859 he patented an invention for the improvement of marine engines, chiefly with a view to the economy of fuel; and among other scientific work he studied photography with considerable success, being awarded a gold medal at the Paris Exhibition, and a bronze one at Dublin, for his discovery of the tannin process in dry plate photography. The open-air study of nature, as a sportsman and wildfowler, was his greatest delight, and aroused all the enthusiasm of his character; his knowledge of birds, their habits and feeding grounds, was most extensive and accurate, far more so than his written notes ever expressed. The company of congenial listeners called forth from the stores of Colonel Russell's memory a remarkable flow of capitally expressed narrative and anecdote, and he has been known to talk continuously for four hours without in the least repeating himself! A well-known Essex wildfowler once said, "He was a marvellous man; I believe he remembered distinctly every shot he had ever fired, and they were thousands." Even in the study his ruling passion was manifest, his favourite literature being books of travel and sport. He collected birds in America and South Africa. The Kafirs had a great respect for the "Whitebeard's" skill as a shot, and it is related that he astonished them once by patiently skinning a black eagle that had become so "high" that even they were repulsed. He was a great advocate for protecting birds and animals, and gave important evidence before the Wild Bird Commission, taking a prominent part in the alteration of the close time, and was the chairman of the committee on this subject appointed by the court of Quarter Sessions. The house-sparrows found in him a persevering and relentless foe, his argument being that the martins and swallows about our villages and homesteads were being rapidly exterminated by this dominant and ubiquitous species. He boasted that at "Stubbers" he had, by killing off the sparrows, increased the number of martins' nests from two to nigh one hundred and fifty. It will be remembered that Colonel Russell read a paper on "Martins and Sparrows" before the Essex Field Club in 1882 (see "Proceedings E. F. C.," vol. iii., pp. xx. xvii). He was a frequent contributor to the natural history and public journals on this question, and was one of the writers, in conjunction with Mr. Gurney and Dr. Elliott Coues, of a volume on the sparrow question, which appeared in 1886. He constantly advocated the claims of his feathered friends for outdoor assistance in hard winters, and in his garden could be seen contrivances in aid of tiny housekeepings, and nets full of scraps of fat and biscuits, etc., temptingly displayed and fitting for the season or the whims and fancies of his little pensioners. The place was indeed a veritable paradise for all that dwell in nests or have the "gift of song." Colonel Russell was one of the keenest sportsmen of his time, and few faces were better known, or will be more missed, in the Blackwater estuary and main. It is now forty-five years since he first came regularly to the river punting and wildfowling, and it is stated that from that time to the present he only lost one season, when in America. His first yacht was the "Greyhound" (16 tons), built for him at Heybridge Basin, which he sailed for 15 years. Next came the "Sheldrake" (20 tons), built at Harvey's, at Wivenhoe, which he used for thirty-two years (he had this and the "Greyhound" together for about two years). Next the "Champion" (28 tons) built at Mr. J. Howard's, Maldon, launched in September, 1886, without a name, but speedily christened by the Maldon Hythe duck hunters, the "Black Goose," and the name still survives. She is a first-class boat, and Col. Russell took great interest in her while building, superintending much of the work himself. The year previous (1885) he had built at Mr. Howard's yard a light punt, he and his skipper working at it themselves during the whole summer, nothing to be touched except when he was present. He was equally careful with his lifeboat built in 1884. Both boats were designed by himself, and were very successful; the punt is an especially interesting craft. The Colonel was always much interested in shipbuilding, and was constantly inventing varnishes and glues and other appliances for his favourite work. So skilful and much at home was he in the yard that strangers have taken him for one of the regular workmen.

He was a remarkably good shot at wildfowl, having one of the biggest guns used in the district, and was known to the Maldon gunners as a most fair-dealing shooter; however small the gun or bad the chance of one shooting with him, the "kill" was always equally divided by the Colonel, always to his own disadvantage. He was most patient and persevering in his pursuit of the black goose, and as Gabriel Clark (who was with him all the forty-five years, and still lives at Maldon) tells, it was wonderful how many hours he would wait and work for them, and whenever he did get near the birds it was "all up" with them, their doom was certain. His knowledge of the Blackwater Estuary and the main outside was far and allowedly superior to that of any of the natives, and he was an authority to the Marsh-bailiffs and oyster dredgermen on many points of river lore.

Colonel Russell was elected a member of the Essex Field Club just a year after its foundation, in January, 1881, and he always took interest in its proceedings, several times attending meetings of the Society. It is a source of great regret to those who have the progress of the study of natural history in Essex at heart, that men like Russell, Gibson, Benson, Varenne, and others, should have been so near the end of their lives before such a Society was successfully established. A vast number of original observations and records have doubtless been thus lost to the natural historians of the County, and where are we to look for a new band of observers to take the places of the good men gone?

Colonel Russell's frank and kindly nature made him welcome everywhere.

To the poor and to the homeless vagrant he was generous even to a fault, and by all who knew him, gentle and simple, he will be mourned and remembered as one upright in all his dealings, leaving behind him the sweet record of a stainless, useful, and honourable life.

W. C. & E. A. F.

MR. E. G. VARENNE, M.R.C.S.

Essex botany has sustained another loss by the death of Mr. Varenne, of Kelvedon. Up to the time of going to press we have been unable to gather materials for a memoir, but we hope to print a notice of the deceased botanist in an early number of the ESSEX NATURALIST.

The Raven (*Corvus corax, L.*)—Last week Mr. Bertie Sadd took three young ravens from a nest on the Lower (Osea) Island in the Blackwater. Last year he took four from the same nest, but only one of these (a cripple) is still alive, the other three were stung to death by bees when in their aviary. From time immemorial ravens have built on the raven tree (an elm) on Northey Island, but this has been deserted now for the last five years. This year we had two carrion crow's and a sparrowhawk's nest on Northey. Yesterday I took five young sparrowhawks from a nest in Hazeleigh Hall Wood. I had previously taken a single egg from the same nest.—EDWARD A. FITCH, Maldon, 8th July, 1887.

Essex Heronries.—(ESSEX NATURALIST, i., 119.) Morant in his "History of Essex" (1768) speaking of Belhus, Aveley, says:—"Here was formerly a heronry, which, being a thing not commonly to be met with, was esteemed a circumstance of no small consequence while the diversion of hawking was in fashion; but of late years not thought to ballance the inconveniences attending it, and the herons therefore not suffered to build longer." (Vol. i., p. 78.) And again, "The Manor of Heron, or Herne, East Horndon, seems originally to have taken its name from a heronry here, as was lately at Belhouse in Alveley. As for the family of Heron that possessed it, and from whom it came by marriage into that of Tyrell, they undoubtedly took their name from this place of their habitation" (Morant, i, 208). The Heron Hall part of Earl Horndon and Ingrave, is now known as Herongate. Sir James Tyrell married Margaret, daughter and heir of Sir William Heron, in the reign of Edward II. or III. A member of the same family, Sir John Heron, held what was late Wanstead Park, then styled "a great messuage called Naked-hall Hawe, and lands in Wanstead and Ilford," but his son Giles, for refusing to acknowledge the supremacy of King Henry VIII., was attainted of high treason and forced in the year 1531 to give his estates up to the king. Giles Heron married Cecilia, daughter of the great Sir Thomas Moore. Thus two of our Essex heronries appear to have been connected with the Heron family; and in Yarrell's "British Birds" (3rd edition ii., 538) we read "Pennant mentions having himself counted more than eighty nests upon one oak at Cressy Hall, near Spalding, in Lincolnshire, an estate then belonging to the Heron family, one of the most ancient in this country." There is a disused heronry at Walton's Hall, Mucking, belonging to the trustees of the late Mr. Arthur Zachariah Cox, of Herongate; it stands on the edge of the marshes south of the railway leading from Stanford-le-Hope to Tilbury, about half a mile from the Thames; the trees are oak and ash with a few elms. Mr. William Clark, jun., who has been tenant of Walton's Hall for some years, tells me he never knew a nest there, although six to eight herons are constantly to be found on his marshes. It is the same here. I see about half a dozen herons almost every day throughout the spring, and have often wondered where they can breed. About seven years ago there was one nest in Mundon Furze, two and a half miles south from here, which was destroyed by shooting through the nest and killing the parent bird. Still this same nest was repaired and occupied next year, and two other nests were built not far off. I saw these, which were subsequently rifled and destroyed, and I have heard of no other nests either before or since.—EDWARD A. FITCH, Maldon, July 10th, 1887.

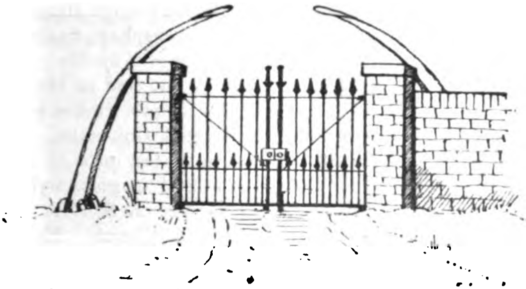
THE ESSEX FIELD CLUB.

FIELD AND ORDINARY MEETING IN THE ROYAL LIBERTY OF HAVERING-ATTE BOWER.

Saturday, June 18th, 1887.

A LARGE gathering (sixty or more) of members and friends of the Club assembled at Chadwell Heath Station, about three o'clock on this beautiful afternoon, some having travelled by road from Buckhurst Hill, Snaresbrook, etc., and others by train. Here drags were in attendance, and the party, under the conductorship of Mr. Walter Crouch, F.Z.S. (with whom was Mr. E. J. Sage, a great authority on the history of the neighbourhood, and the possessor of perhaps the finest collection of views and memorials of it in existence), commenced a rapid survey of the more interesting features of this once celebrated district. Chadwell is stated to have derived its name from a well dedicated to Bishop Ceadda or Chad, a monk sent from Lindisfarne to teach Christianity in Essex some twelve hundred years ago; the "well" still exists at Chadwell St. Mary at the foot of the hill on the marsh edge.

On the high road leading to Romford is the gateway of Whalebone House, where the lower jawbones of the right Greenland whale *(Balæna mysticetus)* flank each side of the gate, a reminiscence of the days when whalers set out for Spitzbergen from the Essex ports. These *may* be more than two hundred years old, and have been painted often, hence their good preservation. The skull of this mammal is the largest known, and these jawbones are about nineteen or twenty feet long, and extend fifteen feet six inches out of the ground. The British Museum of Natural History possess only a skull, and not a complete skeleton, of this huge animal, so valuable for its blubber and whalebone. Near this *was* the old "pike" (Whalebone Gate), abolished in 1866.



GATEWAY AT WHALEBONE HOUSE, CHADWELL HEATH.

(*Sketched by Miss S. Christy for Christy's " Trade Signs of Essex."*)

While waiting for some errant members of the party an excursion was made on foot down the lane to Valence, which was examined by the kind permission of the occupier. It is a most interesting example of a mediæval manor house, with its out-buildings, pleasure grounds, kitchen garden, and lawn, with old cedars—all enclosed *within* a moat. This manor, in the parish of Dagenham, took its name from the family of Valence, Earls of Pembroke, and was formerly held of the Abbess of Barking by the fee of attendance on her with two horses when required Among the many good "armigeri" families who have owned and lived here may be noted Sir Nicholas Coote, who married the daughter of Sir Geo. Hervey, of Marks; and Timothy Lucy, the brother of Shakespeare's "Justice Shallow," of Charlecote.

All having been safely gathered into the carriages, a start was made for Havering, by way of the lane crossing the high road at right angles, and leaving Chadwell Heath with its three windmills on the left. The deep moat by which it was surrounded serves still to record the site of the ancient half-timbered manor-house of Marks, a grand house once, with brick battlemented towers and drawbridge, quaint windows and gable ends, and secret hiding places for religious or warrior fugitives in the troublous times of old. The park is broken up, and the fine old trees are gone, but the fish pond may still be seen, and outside the moat are some buildings of red brick, ivy-clad and picturesque, but of later date than the old mansion, and serving the farmer's use under the name of "The Warren." In this fortified house (which was perhaps built for him) lived Sir Thomas Urswick, Recorder of London and Member of Parliament, knighted on the battlefield of Tewkesbury, the last of the "Wars of the Roses," by Edward IV., in 1471. He died here 1479, and was buried in Dagenham Church, where brasses still may be seen of himself, his wife, and their thirteen children. (Engraved in Ogborne's "History of Essex.")

Later on it was the property and residence of Sir George Hervey, and his son, Sir Gawin Hervey, at whose death it passed to his nephew, Carew Hervey Mildmay, who was born here, and here lived the balance of his life. During the Civi Wars he was colonel in the Parliamentary Army, and in 1648 this house was attacked by a troop of Royalists, but he escaped from a window across the moat, and a few days later took active part in the Siege of Colchester.

The Mildmays resided here till 1784, when the last male of his race, Carew Hervey Mildmay, died, aged 93, who had lived in great style, and rode to and from Marks in the family coach and six, and on Sundays as many as six coaches would carry himself and guests to Romford Church. Then the old house went to decay, the family portraits, etc., were removed to Moulsham Hall, and it was pulled down in 1808.

A little to the north are Marks Stone and the Warren Stone (1642), the boundary of Hainhault Forest, and just beyond is Marks Gate, named from the gate formerly here to prevent cattle straying off the forest.

The route lay along Collier Row to Chase Cross, commonly, but erroneously, known as Cheese Cross, and so to Havering, where the party was met by the Vicar, the Rev. F. Tugwell, and, by the courtesy of Mrs. McIntosh, an "assembly" was called in the fine grounds of Havering Park, from whence a delightful view of the surrounding country was obtained. Under the shade of the trees in the house-garden Mr. Crouch gave a *résumé* of the more notable records of the district, from which the following extracts are taken :—

The Royal Liberty of Havering-atte-Bower was originally one parish, that of Hornchurch, but it now comprises the parishes of Havering, Romford and Hornchurch, which, until the Charter of 1465, formed a portion of the Becontree Hundred.

In early Saxon days, Havering was the abode of the Kings of Essex, but little is known of its history before the time of Edward the Confessor (1042-1066), who either restored or rebuilt the Palace. It was his favourite residence, the only drawback to its seclusion being (so saith the legend) the songs of the nightingales which abounded in the Royal Bower, and disturbed the saintly King in his evening meditations. We need only allude to the legend of the ring, which is said by the old chronicler to have given this parish its name; and to the tradition that the ring taken from his hand nearly a century later is the one now used at the coronation of our Sovereigns.[1]

On his death, King Harold held the Liberty for the disturbed nine months of his reign, and his name still remains at Harold Wood. Then, by right of conquest, it became the demesne of William the Norman, who divided a portion of the land into manors, which he bestowed on his followers.

The granting of the Charter by Edward IV., in 1465, was but a consolidation of pre-existing privileges, and this was confirmed and enlarged by subsequent Sovereigns, especially by Elizabeth, who constituted the tenants and inhabitants one body corporate and politic, and granted them a Common Seal. Among the advantages thus secured may be mentioned the election of a High Steward and holding of separate Courts, freedom from the right of pre-emption—or forced purveyance of provisions, and prices for them, for the King's use—and freedom from tolls, etc.

Not a vestige remains of the Royal Palace, but it was close by the Church, and, by the kindness of Mrs. MacIntosh, we are enabled to visit the site of it, and to see the very beautiful and undulating Park with its extensive views.

Edward III. retired here after the Christmas feast at Westminster, 1376, when he formerly invested the young prince, afterwards Richard II., with the succession to the crown. From Havering Richard II. rode to Plesby to entrap his uncle, the Duke of Gloucester, to his death.

The young Prince Edward VI. and his sisters, Mary and Elizabeth, were brought up at the palace, and the last monarch who slept beneath its roof was Charles I., who visited here in 1641, when Mary de Medici came over to this country.

A few years after, in 1650, a survey was held, and this palace is therein described as "a confused heap of old ruinous decayed buildings, and valued at £480."

On 23rd September, 1828, this royal manor of 1,530 acres, with all its crown rights and prerogatives, including the power of appointing magistrates in the liberty was knocked down at auction to Hugh McIntosh, Esq., in whose family it still remains.

Under the guidance of the Vicar, a visit was made to the church, which was built in 1878, on the site of the old edifice, with its wooden spire and solitary bell, which was formerly the private chapel of the Palace. There are still a few monuments, but the only important feature is the top of the font, which is of Purbeck marble, octagonal, and with simple ornament of rounded arches. It is certainly 11th century work, and was probably placed there in the time of the Confessor. The parish register does not begin till 1677.

The ancient whipping-post and double pair of stocks on the pleasant village green were examined, and then a charming walk was taken through the meadows of Pyrgo Park, gay with wild flowers, among which acres of the Yellow Rattle (*Rhinanthus crista-galli, L.*) attracted some attention. The house and park of Pyrgo was usually in early days made over as part dowry of the Queen's Consort, and was generally their place of retreat when they survived. Thus it was held as dower by Eleanor of Castille, wife of Edward I. (*la chère-rayne* of Charing Cross); by Isabella, wife of Edward II.; by Anne of Bohemia; and Isabella of Valois; the two wives of Richard II.; by Joan of Navarre, second wife of Henry IV. (who was seized here on a charge of compassing the king's death by sorcery); and by others.

Queen Elizabeth granted Pyrgo to Sir John Grey (uncle of Lady Jane Grey), whose son sold it to Sir Thomas Cheke, in whose family it continued, and thence by marriage to Lord Archer, of Umberslade. The old mansion, which stood north of the present one, was pulled down in 1770. In the chapel attached were effigies and monuments of the Greys, Chekes, and Archers, but all appear to have vanished, though the bodies were removed to Havering Chapel.

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[1] For the story of the ring see Stanley's "Westminster Abbey," and a paper by Mr. Waterton in the "Archæological Journal," vol. xxi.—Ed.

The estate (about 700 acres) passed through several owners, and in 1852 the present fine stone mansion was built by Cubitt, which was enlarged and beautified in 1862 from designs by E. M. Barry, R.A., costing over £60,000. It was unoccupied for some years, and was sold last year to W. E. Gibb, Esq.

At the lodge gate the carriages were again entered, and the road to Romford taken, by Gallows Corner (the site of the gallows in olden time) and the main road to Hare Street, passing on the left Hare Hall, a fine palladian residence built by John Arnold Wallinger, Esq., about 100 years ago. At Hare Street Mr. Crouch pointed out the residence of Humphrey Repton, the first "landscape gardener," of whom he read a memoir later in the evening. Also just beyond, on the right, the park of Gidea Hall, a manor house begun by Sir Thomas Cooke, one of the forty-two Knights of the Bath created by Edward IV. at the coronation of his queen in 1465, who in 1467 received the royal license to build "a castle of stone and chalk, turreted, moated, and embattled;" but he only built the front. having been imprisoned during the troublous times known as the "Wars of the Roses." It was completed by his great-grandson, Sir Anthony Cooke, one of the teachers of King Edward VI., and High Steward of the Liberty of Havering. He was a learned and a good man, and his daughters highly cultured. Here in 1568 he entertained Queen Bess, and here in 1638 came Mary de Medici, the mother of Henrietta Maria, Queen of Charles I., on the way to London; the guest of Lady Cooke, the widow of Sir Edward Cooke. The only view of this old hall was published in 1639, in La Serres "Account of the Entrance of Mary de Medici into England." On its front, were inscriptions in Latin, Greek, and Hebrew. In 1657, after two centuries, this estate passed out of the Cooke family, and was sold for £9,000 to Richard Emes of Romford. The old hall was pulled down in 1720, and the present red brick house erected by Sir John Eyles, which was enlarged by Richard Benyon, a subsequent owner, who improved the park with plantations, and a sheet of water reaching to the high road, and an ornamental bridge of three arches designed by Wyatt.

Arriving at Romford, tea was taken at the "White Hart" Hotel. After tea an ORDINARY MEETING (the 78th) was held, Mr. T. V. Holmes, president, in the chair, at which the following were elected members of the Club:—Messrs. A. Akers, W. Bewers, W. E. Bovill, W. H. Bradshaw, H. J. Cook, Mrs. Cook, Messrs. S. A. Courtauld, C. J. Dawson, T. Gowland, Mrs. S. Hall, Mrs. Heathcote, Messrs. C. R. Higgins, F. Parr, A. Lussignea, W. J. Pickworth, H. T. Twine, Mrs. H. Wall, and Mr. W. C. Waller.

Letters relating to the subject of the meeting were read from Sir Richard Owen, C.B, F.R.S., and Mr. McLachlan, F.R.S., and the Secretary announced that Mr. S. Carvalho had presented to the Club a valuable cabinet of British fossils. Mr. Walter Crouch exhibited a series of views, engravings, and books relating to the district traversed during the afternoon. He also called attention to the fact that in the short notes on the programme he had only touched upon the interesting historical reminiscences of Havering and Romford. Many notable names would occur to all who had studied the records of the district, such as Sir Anthony Cooke and his family, whose home was the centre of classical culture; the learned Sir John Cheke, the first Professor of Greek at Cambridge; and there are two names that will ever be remembered in connection with Romford—Francis Quarles, the poet, born at "Stewards," near Romford, in 1592, and Humphrey Repton, landscape gardener.

Mr. Crouch read short memoirs of both these worthies; that of Humphrey Repton will probably be printed in a future number of the ESSEX NATURALIST.

The President, in moving a vote of thanks to Mr. Crouch, and to those who had assisted in making the meeting a success, took occasion to refer to the geological characters of the site of the royal palace of Havering. It had been suggested that the spot was chosen as being in the heart of the Essex forests, which abounded with game, and because it was a scene of great natural beauty. The first-mentioned quality was no doubt an important one in the eyes of the early kings, but it was one that attached to many other parts of the district. As to natural beauties and extensive scenery he thought the Saxons and Normans cared for none of these things; but they could and did appreciate the advantages of good drainage and a plentiful supply of water. It would be seen from a glance at the geological map of Havering that the site of the palace was on a little oasis of pebble beds and pebble gravel, in the desert of London clay, and just on the borders of the fertile Chalky Boulder Clay. On these pebble beds good drainage and spring water could no doubt be had, and the early royal settlers knew this and acted on their knowledge. They had freedom of settlement in those primitive days—"the earth was all before them where to choose their place of rest"—and the strongest took the best positions.

An adjournment was then made to the Church of St. Edward the Confessor, where the party was received by the Rev. G. E. Hitchcock, in the unavoidable absence of the Vicar, Canon Hitchcock. Under Mr. Crouch's guidance the many interesting monuments in the church were inspected, and in the course of an address on the history of the town and church of Romford, Mr. Crouch said:

"The stream called the River Rom rises in the valley between Havering and Navestock, where it is called the Bourne Brook, and passes through Collier Row, by Easthouse, and through the town at the brewery to Old Church, and thence by Dagenham to the Thames. It was in old days known as the Mercke-dych, probably from its running through the Manor of Marks, and the name remains in Dagenham, where the river runs past Mardyke Farm and Little Mardyke.

There can be little doubt that Dr. Stukeley was correct in identifying Romford, or its immediate neighbourhood, with the Roman station Durolitum, and the site of it was doubtless about half a mile south of the town at Old Church, where we find, from a map dated 1696,[2] certain fields described as "Ruin Meadow," "Great Ruings," "Lower Ruings," and "Three Little Ruings."

At this place, in Ruin Meadow by the (Rom) ford, was built in 1323 the Chapel of St. Andrew, for the use of the people of Romford, whose parish church was far away at Hornchurch; but as the town spread and grew rapidly in size and importance, probably from its proximity to the Royal demesne, a grant was obtained in 1406 to build a new Chapel of larger size in the town on the present site, and this was dedicated to the Virgin Mary and St. Edward Confessor. It consisted of a nave, chancel and north aisle with square embattled west tower, containing a peal of eight bells.

This Church stood for 443 years, and was pulled down in 1849, and the present larger and handsome structure was built, chiefly through the exertions of Archdeacon Grant, the then Vicar. A portion of the old materials were utilized, and the important monuments carefully preserved. Many of the old tombs and inscriptions described in the Visitation of Essex (1634), and "Weever's Ancient Monuments" (1631), had disappeared long before; amongst them the altar-tomb, with its brasses and curious rhymes, to the memory of Master Avery Cornburgh and Beatrice, his wife, of the Manor of Gooshays. He was Esquire of Body to Edward IV. and Richard III., and Treasurer to Henry VII. He endowed a Chantry and Obit, 1486, for the repose of their "sowls," to preach sermons, etc., and left many benefactions to the poor. The gabled Chantry House for the priest still exists in High Street, close by the Church, and a portion of the old work may be seen at the back of the house, which is now known as the "Cock and Bell."

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[2] Now in possession of E. J. Sage, Esq., and copy of which was exhibited by Mr. W. Crouch.

In the porch, but formerly on the south wall of the chancel, are the monuments of Sir George Hervey of Marks, 1605, with kneeling effigies of himself and lady, with their five sons and four daughters, and opposite, the recumbent figure of his sister, Anne Carew, who died 17 days after her brother, and which was placed there by her son, Lord Carew, "for his last duty."

But the largest and most interesting is one on the north side, in memory of Sir Anthony Cooke, of Gidea Hall, who ob. 1576, with its finely carved figures in alabaster of himself and two sons in armour, with his Dame and their four daughters—Mildred, who married Cecil, Lord Burleigh, Prime Minister to Elizabeth; Anne, wife of Sir Nicholas Bacon, Keeper of the Great Seal, and mother of Lord Bacon; Elizabeth, wife of Lord Russell; and Catherine, wife of Sir Henry Killegrew. Beneath are curious and lengthy eulogistic verses in Latin, Greek and English.

The Register of this Church begins in 1561, and among the benefactions may be mentioned those of Mildred, Lady Burleigh, 1588, and Roger Reede of Havering, 1482, whose almshouses are still to be seen in North Street.

Romford was made a separate parish in 1658, and the Wednesday Market, which is held in its broad main street, has existed here since 1247.

Early in the last century, the celebrated "Belle of Essex," Mary Braund, lived in Romford, and, at the age of "sweet seventeen" became the wife of Champion Branfill of Upminster Hall, where a fine portrait of her, by Sir Godfrey Kneller, still beams from the wall.

At sunset the meeting broke up, and the members were driven home, some to Ilford and Snaresbrook, and others across country to Woodford and Buckhurst Hill, well pleased with a visit to a district once so celebrated and important, the home and birthplace of many whose names are linked with the makers of England—a land now almost unknown as historical, save to a few students of musty books and records, but, spite of all changes, a pleasant spot to ramble in; through lanes, meadows and relics of Royal parks, still charmed with birds and decked with flowers as in the days of the Saxon Kings, by red-bricked homesteads and ancient landmarks, recalling memories and legends of times past, men dead, and places long forgotten.

W. C. & W. C.

EXCURSION TO SUDBURY, Saturday, July 9th, 1887.

A PARTY consisting of nearly thirty members of the Geologists' Association and the Essex Field Club passed a very pleasant and instructive day at Sudbury, on Saturday, July 9th, under the guidance of Dr. Holden, of Sudbury, and Mr. W. Whitaker, F.R.S., of the Geological Survey. The day was exceedingly fine. Crossing to the Essex bank of the Stour, Mr. Whitaker pointed out that in spite of the drought the river was brimfull, a rare thing in British streams just now. This was the result of the comparative independence of the immediate rainfall in rivers like the Stour, which derive their water mainly from springs in the chalk. Proceeding to Balingdon the party first inspected the great chalk pit, in which, above the Chalk, Thanet Sand, Reading Beds and London Clay were seen. Walking thence in an easterly direction the splendid sections of glacial drift at "The

Grove" were visited. They caused much surprise, both from the excellence of the sections themselves, and from the suddenness of the incoming of the drift, which there cuts down through the Thanet Sand to the chalk. After an interval for luncheon the party visited the pits on the Suffolk side of the Stour. They were so numerous and so full of varied interest that anything like an adequate description of them would occupy an entire number of the ESSEX NATURALIST, at least. All, therefore, that can be said here, is that in addition to chalk, Eocene beds, and glacial drift, the Pliocene Red Crag was more or less well displayed in them. It may, perhaps, be well to add that the "Crag" of East Anglia is sand containing shells. In short, members of the Geologists' Association must have felt that both in quantity and quality the geological sections visible at Sudbury would compare favourably with those of any inland town they had ever visited.

After tea at the "Rose and Crown," and the passing of a hearty vote of thanks to Dr. Holden and Mr. Whitaker, the great majority of the party returned to London by the 6.29 train. Six or seven, however, including Mr. Whitaker and the presidents of the two societies, proceeded northwards to Bury St. Edmunds, where Mr. Henry Prigg (the well-known discoverer of the only bones probably of Palæolithic age that have yet been found in Britain) kindly obtained admission for them to view the very interesting museum of the town, and also showed them his private collection of stone implements. The objects of archæological interest in Bury, the remains of the Abbey, the magnificent churches of St. James and St. Mary, the Norman tower, etc., also received their due share of attention. Nor did the party forget the associations of their hotel, the "Angel," with Mr. Pickwick, or that Bury was the scene of his nocturnal adventure at the boarding school for young ladies. T. V. HOLMES.

Capture of a Large Trout in Cripsey Brook, Ongar.—On Tuesday as the pupils at the Grammar School at Ongar were clearing out a hole in Cripsey Brook, at the bottom of Dr. Clark's field, in search of fish, they caught a very fine salmon trout, weighing over two pounds, and about eighteen inches in length. This fish being remarkably scarce in the neighbourhood, considerable interest has been taken in the capture. It is said that about five or six years ago Mr. Rodwell, of High Laver, put into the river about 2,000 small trout, the consequence being that at various times since small trout have been caught. One weighing over one pound was caught last year at Moreton, and another was caught at Passingford Mill. The remarkably fine specimen found on Tuesday may now be seen alive in Dr. Clark's new swimming bath. There is said to be another trout in the vicinity of the Railway Bridge.—"Essex County Chronicle," July 8th, 1887.

Section in a new Railway Cutting at Maldon.—Mr. E. A. Fitch having kindly informed me of the existence of a section from thirty to forty feet deep on the line of railway now being constructed from Maldon to Woodham Fen, I visited it under his guidance on June 23rd. The cutting we inspected is west of the town of Maldon, and ranges in a nearly north and south direction. It lies between the two westerly roads which unite near Danbury, and the more northerly of which cuts through Maldon Camp, being a few yards west of the camp and east of Maldon Hall. The beds disclosed consisted of gravel and loam of glacial-drift age overlying London-clay. The section now visible is a very fine one, and, among other things, illustrates the difficulties encountered by the geological surveyor in mapping the boundary lines of beds variable in composition and uniformly soft in character, especially when the sections available are but small and shallow. In this case, however the modifications of the geological (drift) map made possible by the evidence afforded by this cutting are but slight, though the section is one of great interest, and should be visited by geologists before its sides are sloped and its glory departed.—T. V. HOLMES, F.G.S., July, 1887.

Voracity of the Adder.—On May 24th last, I found an adder in Monk's Wood, Epping Forest, with a very large Field Vole (*Arvicola agrestis*) in its stomach. The adder weighed four ounces before dissection, and the weight of the vole was as nearly as possible one ounce, so that the snake had swallowed one-third of his own weight at a mouthful. He did not seem to be at all incommoded by his meal, and was beating a hasty retreat when discovered.—REGINALD W. CHRISTY, Roxwell, June 17th, 1887.

The Badger (*Meles taxus*).—In my previous note (ESSEX NATURALIST i., 114) I omitted to state that I have myself seen a badger in Essex. This was nearly twenty years ago. One evening as we were fishing for jack in the Stour, almost half a mile above Wixoe mill, we saw a badger go along the meadows towards Bumpstead. We attempted to follow it, but soon lost sight of the animal somewhere between Science's pit and Watsey bridge. Thanks to Mr. William Eley I am able to give further information about the Braxted badgers. He writes me: "In 1851, we had a pair of badgers from Laindon Hills, and they bred both the succeeding years, having four young ones each time; but the keepers took the young ones and sold them, and we have not had any since 1854."—EDWARD A. FITCH, Maldon, June, 1887.

The Wild Duck (*Anas boscas*, L.).—I hear that upwards of fifty "flappers" have been seen in the ditches of South Wick, Southminster Marshes, quite lately. They breed in this neighbourhood much more rarely than formerly; in 1875 a nest of eggs hatched here on my home farm (Brick House), but there has been no sign of one since. One nest hatched off on Northey Island this year. I have seen quite fifty young ones in a day in the Canvey fleets, and had rare fun with them, but I have not been there lately. This spring I saw wild ducks' eggs selling retail in London at twopence each, while peewits' eggs were making sixpence apiece; the latter costing five shillings per dozen wholesale in the market. I am told that upwards of three hundred peewits' eggs have been taken (stolen !) off my farms this year.—EDWARD A. FITCH, Maldon, June, 1887.

Well-section at Roxwell, Essex.—An interesting well-section is now open in this parish (Roxwell) exposing the boulder clay. The section at present arrived at is as follows:—Top soil two feet, white boulder clay twenty-eight feet, dark blue clay twelve feet (not bottomed at present)—total forty-two feet. This lower clay is totally different from our ordinary clay, and is of a dark blue colour, turning whiter on exposure to the air. It contains chalk, flint and other boulders, exactly the same as the upper stratum, but up to the present time only one fossil besides a few fragments of belemnites has turned up, viz., *Gryphæa dilatata*. The sections east of the well do not show any trace of this dark clay, nor do I see it recorded anywhere nearer than Feering, a village some fifteen miles north-east of this place. Two miles north-west of Roxwell, however, it occurs again, but somewhat nearer the surface, as the white clay thins out considerably in that direction. This is in the parish of Margaret Roothing, which seems to be a part little worked by the Geological Survey, as no record of sections for some miles round is given.—REGINALD W. CHRISTY, Roxwell, June 17th, 1887.

Danewort or Dane's-blood.—The following extract from the Hon. R. C. Neville's (afterwards Lord Braybrooke) "Antiqua Explorata" (1847) would seem to indicate that two plants have in Essex the reputation of springing from the blood of slaughtered Danes. One, the well-known dwarf-elder or Danewort (*Sambucus ebulis, L.*) whereof old Camden thus speaks: "*Dane-wort*, which with bloud-red berries, commeth up heere (Barklow) plenteously, the country people still call by no other name than *Danes-bloud*, of the number of Danes that were there slaine, verily beleeving that it blometh from their bloud"; and the other, a small purple-blossomed plant. Writing of Hadstock, Mr. Neville says, "Among the lower orders of this parish, the general impression would seem to be strongly in favour of a Danish ancestry, as a little purple flower prevalent in the neighbourhood is called 'Danes-bloud,' and to the berries of the dwarf elder the villagers apply a similar appellation." We shall be glad to hear from local botanists whether the words "danes-blood" and "danewort" really indicate distinct plants.—ED.

ON A NEW BRITISH ALGA (*VAUCHÉRIA SPHŒROSPORA*, NORDSTEDT) LATELY FOUND NEAR MALDON.

By E. M. HOLMES, F.L.S., etc.

[*Read November 28th*, 1885.]

During a recent visit to this country Professor Otto Nordstedt detected several species of *Vaucheria* new to Great Britain, and amongst them a form of *V. sphærospora* near Maldon, in Essex, growing along the banks of the river for "one mile on both sides of the bridge." This plant is an interesting one for several reasons, and a brief notice of it may therefore possibly be acceptable to the members of the Essex Field Club.

In a revision of the genus *Vaucheria*, published in the "Botaniska Notiser" for 1879 (p. 177), Prof. Nordstedt divides the genus into two principal sections, one of which has the antheridia sessile on the filaments of the thallus, and in the other there is an intermediate empty cell between the antheridium and the thalline filament. The species under consideration belongs to the second section, and to a sub-division of it, characterised by the oogonium, or female reproductive organ, containing a *globular* oospore; the oogonium being attached directly to the thalline filament, *i.e.* without an intermediate cell. To this sub-division belong the following species:—*V. sphærospora*, Nordst., and its variety *dioica*, Rosenvinge; *V. intermedia*, Nordst. and *V. coronata*, Nordst. The last is easily recognised by the oogonium having five or six projecting openings, forming a sort of crown at its apex, and by the cylindrical antheridium having an obtuse apex, and only one, or rarely two, lateral openings. *V. intermedia* has the oogonium nearly sessile, and furnished only with one apical opening, and the antheridium has an obtuse apex with *several* lateral openings, and either arises from the oogonium itself, or is attached close to its base.

Vaucheria sphærospora differs from the last in the oogonium being pyriform, *i.e.* tapering below into a short cylindrical stalk, the globular oosphere filling the upper portion only; the antheridium is cylindrical acute, with one opening at the apex, and two or more at the sides.

In the typical form of the plant the antheridium arises from near the base of the oogonium, and the two organs are therefore easily observed at the same time. In the plant found by Dr. Nordstedt at

Maldon this is not the case, the antheridia being found on separate individuals. By L. Kolderup Rosenvinge this form has been described as a variety. Dr. Nordstedt, however, after numerous observations made on the young plant, concludes that it cannot be regarded as more than a form of this variable species.[1] *V. sphærospora* is probably identical with the *Vaucheria velutina*, Harvey, of which a figure is given (with the oogonium only) in "Phycologia Britannica," vol. iv., t. cccxxi.[2]

Vaucheria sphærospora, *f. dioica*, Nordst., grows on the shores of muddy creeks, forming pale-green matted velvety tufts visible about a quarter of an inch above the mud. The plants are densely intricate, and are furnished with short erect lateral ramuli. Subsequently Dr. Nordstedt found the same plant on the muddy banks of the Thames near Kew Bridge. I have also received it from Cornwall, in which county it was collected by Mr. R. V. Tellam on the shady banks of the Fowey river, half-way between Lostwithiel and Fowey, and near highwater mark. Mr. Tellam's specimens bear the date of September 16th, 1880, and they are evidently the dioicous form of the plant.

I may add that Dr. Nordstedt has also detected the following marine species not previously recorded, so far as I am aware, as British plants, viz. :—*Vaucheria thuretii*, Woron., *V. litorea*, Hoffm., *V. synandra*, Woron. Figures and descriptions of these species were published in the "Scottish Naturalist" for October, 1886, in a paper entitled "Some Remarks on British Submarine Vaucheriæ."

Gravel on Northey Island, near Maldon.—On the occasion of my visit to the Maldon railway cutting, Mr. Fitch was also good enough to drive me over to Northey Island, which is situated about a mile and a half south-east of Maldon, and is shown on the geological (drift) map to be composed of about one-third London-clay and two-thirds marsh, the London-clay being towards its south-western end. At the northern end of the part coloured London clay, and close to, but west of, the only house on the island, Mr. Fitch pointed out a small patch of gravel that had escaped the notice of the geological surveyor. There was, indeed, nothing in the contour of the ground to suggest the existence of anything beyond London-clay and marsh. The area occupied by this small deposit of old estuarine gravel is but a few square yards, nevertheless its existence is a matter of some consequence to Mr. Fitch, whose land is almost wholly London clay and marsh, and who uses the gravel in road-making. And as a glance at the drift map shows abundance of gravel immediately east of Maldon and north of the channel of the Blackwater, and its absence from the southern side, this Northey gravel is eminently worthy of being noted on future editions of the map simply from its importance to agriculturists.—T. V. HOLMES, F.G.S., July, 1887.

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[1] See Nordstedt's remarks, "Scottish Naturalist," 1886, p. 382, and my paper on "British Marine Algæ," Ibid., p. 258.

[2] In this plate the lower right-hand figure with sessile oogonium is probably referable to *V. thuretii*, Woronin. Nordstedt found the two species growing together near Ballachulish, one of Harvey's localities for the plant.

Special Notices to Members.

The Deneholes in Essex.—Arrangements are now being made for the resumption of the explorations of the deneholes at Chadwell early in September next. The explorations will, as before, be conducted by Mr. T. V. Holmes and Mr. W. Cole, under the directions of the Denehole Exploration Committee. As the balance of the Denehole Fund is insufficient to cover the cost of the proposed work, it is intended to issue with the next number of the ESSEX NATURALIST an appeal for fresh aid, with full list of subscribers, more especially addressed to those who have not yet joined in aiding on this interesting exploration. Subscriptions may be sent to the TREASURER, marked "Denehole Exploration."

Excursion Committee.—This Committee is now constituted, and consist of the following members:—The officers of the Club *ex officio*; Messrs. W. J. Argent, Walter Crouch, Alfred Lockyer, W. White, Rev. W. L. Wilson, with Mr. Thos. Royle as Hon. Secretary. A list of the proposed Field Meetings for the remainder of the season, with dates, etc., will be issued with the next circular. They will probably comprise a trip up the River Lea by water, a visit to Saffron Walden, to the British Museum, the Highgate Woods, the Fungus Foray, and possibly a botanical meeting in some part of wooded Essex. All communications should be sent to Mr. Thos. Royle, "Dalton House," Upton Lane, Forest Gate, E.

British Association for the Advancement of Science.—The Essex Field Club has again been elected one of the Corresponding Societies of the British Association. Our Delegate at the Meeting of the Association at Manchester, which will commence on Wednesday, August 31st, 1887, is Prof. R. Meldola, F.R.S., 6, Brunswick Square, London, W.C., to whom any communications should be addressed. The Corresponding Societies' Committee has issued a very interesting report, an abstract of which will shortly be given in the ESSEX NATURALIST.

Pre-Historic Remains in Esssex.—The Secretary has undertaken to draw up for a Committee of the British Association a preliminary catalogue of the pre-historic remains in Essex, and will be very grateful for any information, original or extracted, bearing upon this subject, either for the catalogue, or for immediate publication in the ESSEX NATURALIST. It is intended to make this catalogue the foundation for a more exhaustive account of the earthworks and other pre-historic remains in Essex, and full details of the information required will shortly be given. Meanwhile attention is recalled to Prof. Meldola's paper on "Local Scientific Societies, and the Minor Pre-historic Remains in Britain" (Transactions E.F.C., vol. iv., p. 116), and our President's remarks in his last Annual Address (ESSEX NATURALIST, pp. 71—81). Communications to be sent to W. Cole, 7, Knighton Villas, Buckhurst Hill.

Forthcoming Meeting of the Essex Field Club.

SATURDAY, AUGUST 6TH, 1887.

A FIELD MEETING will be held in EPPING FOREST, on the above afternoon, for a Woodland Ramble. The Club will assemble at THEYDON BOIS Station on the arrival of the 2.13 p.m. train from Fenchurch Street (the 2.10 train from Liverpool Street, changing at Stratford). The precise route will be announced at the Meeting, and will be in the northern portions of the forest. During the afternoon the following Address will be given:—

"LAND AND FRESHWATER MOLLUSCA, AND THE METHOD OF COLLECTING THEM." By J. E. HARTING, F.L.S., F.Z.S., etc. (*Editor of the "Zoologist."*)

The object of the Meeting is to attract attention to the Mollusca of the County, and to induce Members to commence gathering and studying them, with a view to the publication of the results. Mr. HARTING has undertaken to draw up a list, etc., of the Mollusca of the Forest district, as announced in No. VI. of the ESSEX NATURALIST, and will be very glad to receive specimens (*with notes of precise localities and habitats*) and any lists or other information addressed to him at the British Museum (Natural History), Cromwell Road, South Kensington, S.W.

TEA will be provided *in the Forest in a Marquee* for all who send DEFINITE ORDERS to B. G. COLE, 7, Knighton Villas, Buckhurst Hill, Essex, *on or before* THURSDAY, AUGUST 4TH, *but not otherwise.* The TICKETS are 2s. 6d. each person (for tea and incidental expenses).

After Tea an ORDINARY MEETING (the 79th) will be held, for the proposal and election of Members. As the season is rapidly advancing, the Secretary will be glad to receive at once the names of those wishing to join the Club. The following stand for election at the above Meeting:—

HERMANN COHN, 5, St. Andrew's Place, Regent's Park.
ROBERT LODGE, Great Gearies, Ilford.
ROBERT N. A. WALLINGER, Writtle, Chelmsford.

Excellent Maps of the Forest are given in Buxton's "Epping Forest" (1s. 6d.), and some interesting topographical information will be found in Lindley's "Walks in Epping Forest" (6d.)

WILLIAM COLE,
Buckhurst Hill, Essex. *Hon. Secretary.*

SUBSCRIPTIONS.—Subscriptions for 1887 were due on 1st January last. All who have not remitted are requested to do so at once, in order to save the trouble and expense of the sending out of individual notices. Address the Treasurer, THOMAS ROYLE, Esq., "Dalton House," Upton Lane, Forest Gate, E. POST ORDERS should be made payable at STRATFORD, E., and Cheques crossed "London and County Bank," Stratford Branch.

N.B.—The attention of Members is directed to several important notices on page 3 of the Wrapper.

Printed by W. H. & L. COLLINGRIDGE, City Press, 148 & 149, Aldersgate Street, London, E.C.

E. T.

NO. 8.] *Price, with Map, to Non-Members, 1s. 6d.* [AUGUST, 1887.

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The
Essex Naturalist:

BEING THE

JOURNAL ["TRANSACTIONS" AND "PROCEEDINGS"]

OF THE

ESSEX FIELD CLUB.

EDITED BY

WILLIAM COLE,
Honorary Secretary.

Contents:

PAGE

Theydon Bois: an Inquiry into the Origin of the Word "Bois" as applied to a portion of the Ancient Manor of Taidena, Essex—By BENJAMIN WINSTONE, Memb. Brit. Arch. Association (*with a facsimile of Morden's Map of Essex*, 1695) 153

Notes.—Bees at Field Beans—REGINALD W. CHRISTY; Green Tree Frogs (*Hyla*) in Epping Forest—W. G. MACMURDO 159

Bird Harmonies.—By F. CARRUTHERS GOULD (*with plate*) 160

Notes.—*Inula helenium*, L., near Fyfield—R. PAULSON; Essex Alga—ALFRED P. WIRE; Stone Mites (*Petrobia lapidum*)—A. P. WIRE; Woodcock (*Scolopax rusticula*) Nesting in Epping Forest—J. E. HARTING 166

Report of Field and Ordinary Meeting, Essex Field Club, August 6th, 1887 .. 167

Note.—*Dicycla oo*, L., in Epping Forest—CHARLES OLDHAM 168

Land and Freshwater Mollusca, and the Methods of Collecting and Preserving them—By J. E. HARTING, F.L.S., etc. 169

Notes.—*Stauropus fagi*, L., near Brentwood—R. G. WILLIMENT; Grasshopper Warbler (*Locustella nævia*), near Colchester—FREDERICK SPALDING.... 176

The authors only are responsible for the statements and opinions contained in their respective Papers.

PUBLISHED BY THE CLUB, BUCKHURST HILL, ESSEX.

1887.

[Ent, Stationers' Hall.]

With this Number is sent out a fac-simile reproduction of Robert Morden's Map of Essex, 1695.

All Communications should be Addressed:—
The Editor of "THE ESSEX NATURALIST,"
7, Knighton Villas, Buckhurst Hill, Essex.

PROPOSED RENEWED EXPLORATIONS OF THE ESSEX DENEHOLES.

An Appeal for further Funds, addressed more particularly to those Members who have not already subscribed.

As announced on the wrapper of the last number of the ESSEX NATURALIST, it is intended, if the funds will permit, to recommence the explorations of the Deneholes in Hangman's Wood, Chadwell, near Grays, Essex during the coming autumn. The first series of systematic explorations were carried on by Mr. T. V. Holmes and Mr. W. Cole from October 13th to November 10th, 1884 and a preliminary report was read at a meeting of the Club on November 29th of that year. Although the results were such as to encourage the Committee to persevere in what is allowed to be a very difficult but deeply interesting research, it was not deemed advisable to publish the preliminary report until some further evidence had been sought for. Owing to the large amount of time necessary to superintend the work and the difficulty of obtaining efficient aid, the Committee has been unable to renew the explorations up to the present time, but it is hoped that they may be able to do so in September next.

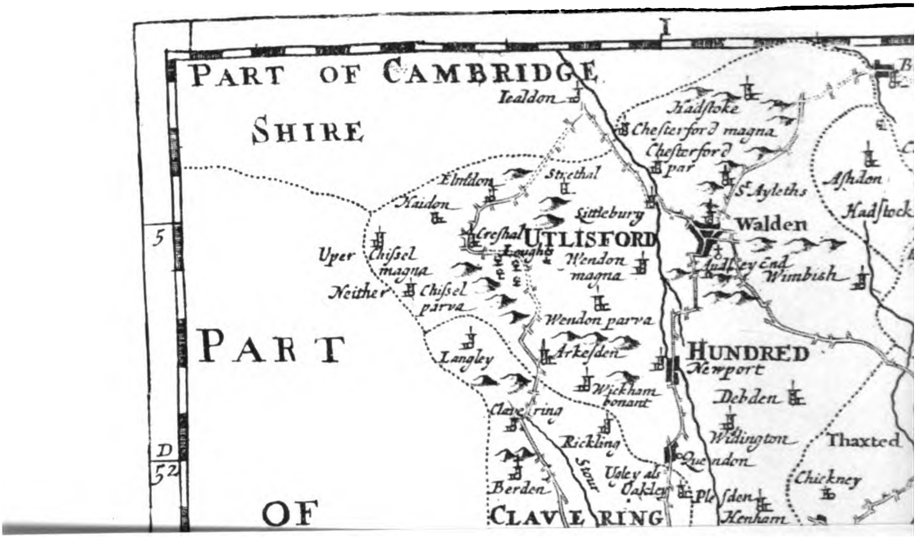
A large amount of information as to the nature of the Deneholes in Essex and Kent will be found in Mr. F. C. J. Spurrell's paper on "Deneholes and artificial caves with vertical entrances" ("Archæological Journal," 1881); in Mr. T. V. Holmes's papers "On Deneholes" (Trans. Essex Field Club, iii. 49), and "Miscellaneous notes on Deneholes" (Trans. Essex Field Club, iv. 87), and in Mr. W. Coles's reports of the visits of the Club to Hangman's Wood in 1882 ("Proceedings Essex Field Club," iii., pp. xxviii. and lvi., and vol iv. p. xx.), and the Secretary will be happy to send a copy of the illustrated circular issued by the Club in 1884 to any one interested in the subject.

The Committee now make an APPEAL FOR FURTHER FUNDS to enable them to continue the investigations. A list of subscriptions already paid or promised since the starting of the fund in 1884 is appended. When all the subscriptions are paid in, and the expenses of the former explorations and purchase of "plant" are deducted, about £35 will be left for the renewed explorations. The working expenses are £12 to £13 per week; so that to carry on the exploration for a month about £15 or £20 will be required beyond the subscriptions already promised.

A very large number of members have not yet contributed, and it is to them and to new members that this appeal is made. Opportunities will be afforded during the work for an inspection by the members of the very interesting series of pits now opened up, and as soon as the explorations are finished, a full report will be placed before the Club.

The following gentlemen were, in 1884, appointed a Committee (with power to add to their number) for the purpose of conducting the investigations:—

T. V. Holmes, F.G.S., M.A.I. (*Chairman of the Committee*), Prof. G. S. Boulger, F.G.S., F.L.S., Herbert E. Brooks, B. G. Cole, W. Cole, E. A. Fitch, F.L.S., Prof. Flower, F.R S., A. Lockyer, Prof. R. Meldola, F.R.S., N. F Roberts, F.G S , F. W. Rudler, F.G.S., Worthington G. Smith, F.L.S.,



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Henham
CLAVERING

THEYDON BOIS: AN INQUIRY INTO THE ORIGIN OF THE WORD "BOIS" AS APPLIED TO A PORTION OF THE ANCIENT MANOR OF TAIDENA, ESSEX.

By BENJAMIN WINSTONE, Memb. Brit. Arch. Association, etc.

MORANT, in his "History of Essex," states that the Manor of Theydon, entered in Domesday Book "Taidena" or "Teindena," of which Theydon Bois is a portion, probably derived its name from the Saxon words "Thegn-Dun"—Thegns' hill, or Thanes' hill; and that it was the extensive domain of a Saxon Thegn or Thane.[1] At the time of Edward the Confessor, Hacun, and Uluuin, and seven freemen enjoyed the parish. After the Norman Conquest, it was divided into three manors, Theydon Mount, Theydon Garnon, and Theydon *Bois*. He supposes that "the addition of *Bois*, signifying in French 'wood,' was annexed to the name either because it stood more among woods than the others, or else it received it from some ancient possessor styled De Bosco."[2]

At the time of the general survey, Taidena was held by Peter de Valoines; and in 1166, under Robert de Valoines, Osbert de Tainden held a knight's fee here; and William de Bosco one knight's fee of the new feoffment. The church of Theydon Bois was given by William de Bosco to the Priory of St. Bartholomew, West Smithfield, which had been founded about fifty years before (1102) by Rahere, minstrel to Henry the First.[3]

The statement that Theydon Bois stood more in the forest or bush than the other portions of the ancient manor of Taindena may be accepted as correct. When Morant published his "History of Essex" (1768), the road from Epping to Theydon Bois was through the forest; and, as late as 1860, the portion of the road nearest to Epping ran through the forest, which, on the right hand side, continued all the way to the church—even now approached through the remaining portion of the forest alluded to.

But the pronunciation of the name Theydon Bois, as if spelt "Boice," differing so much, as it does, from that of the French word for wood, affords ample grounds for looking to some other language than French for its origin. As the manor of Taindena was in the possession of Saxon Thegns, or Thanes, at the time of the Norman Conquest, and consequently before the introduction of French into England, there is afforded a sufficient reason for believing that the source of the name should be sought for, in the language spoken by the Saxon, or Teutonic cultivators of the soil.

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[1] Morant's "History of Essex," Vol. I., page 155. The references to Morant's "History" are to the Chelmsford reprint, 1816.

[2] Ibid, Vol. I., pages 161 and 162.

[3] Ibid, Vol. I., pages 162 and 163.

The Teutonic name for wood is Bosz[4]; Flemish, Bosch[5]; German, Busch; Anglo-Norman, Boys.[6] Without attention to the sound of the letters B-o-s-z and B-o-s-c-h, they do not seem to convey that of Boice; but on examination it will be found to very closely approximate to it. We have in English an *o* sounded as if joined on to *r*. It is heard in, a not unusual mode of pronouncing, cross, lost, toss, frost, etc. If then Bosz and Bosch be pronounced with the *o* sounded as above-mentioned, and the voice allowed to dwell on the terminal consonants, which was no doubt intended, a pronunciation will result similar to that of Bois—in Theydon Bois—by the inhabitants of the parish and surrounding districts. A Fleming, however, at the present time would not sound the *o* broad or long; but there can be no doubt but that it was, formerly, in many words a long *o*, although it has undergone a change; for in the fifteenth century "cross" was spelt "croys" and "crois" (to which reference will be made a little further on); and Mr. Ellis, in his paper on "Early English Pronunciation," says, "The long *oo* is also sometimes heard from those London speakers who wish to prolong the sound of *o* in dog, cross, off, office. It is also the sound most esteemed in oar, glory, story, memorial."[7] It is not, therefore, assuming too much to suppose it was so sounded by our Teutonic ancestors, and that Bosz and Bosch were sounded like "bosze, *borough*, *castle*, *city*."[8]

The adventurers who assisted in the Norman Conquest and settlement of England were gathered from various parts of the Continent; and William de Bosco, who held land in Theydon, in 1116, and gave the church to the Priory of St. Bartholomew, in West Smithfield, probably came from Flanders, so that the sound of Bosz or Bosch was familiar to him. But as Italian and Spanish priests were freely introduced into English religious houses, a priest of one of those nationalities may have drawn the deed of gift; and being unacquainted with the sound of *ch*, entered the name of the donor

[4] Bailey's English Dictionary, 1742. Under Boseham, a town in Suffolk.

[5] "Dictionnaire Flamand et Francaise," by F. Halma, 1719.

[6] J. O. Halliwell's "Dictionary of Archaic Words."

[7] Early English Text Society, "English Pronunciation," page 94.

as De Bosco, using a termination he was accustomed to, as in Como, Arno, Duro, Toledo, Antonio, etc.[8]

Before the end of the reign of Henry the Third (1216-1272), charters, grants, etc., were drawn either in Latin or in Norman-French, and the Norman word for wood, *Boys*, came into use to designate the portion of Theydon situated in the wood.

In the reign of Edward the First (1272-1307), in a grant made to Waltham Abbey, the name is spelt Tenden *Boys.*

1343.—Ellen and Joan, daughters of Laurence de *Boys*, released all the lands formerly belonging to their grandfather.[9]

1345.—Adam de Wells held a tenement called Hemerhales, in Theydon Garnon, and in Theydon *Boys*; John, his son, held land in Theydon Garnon, Epping Hethe, and Theydon *Bois.*[10]

1413-1422.—Henry the Fifth ordered Simon de Boice, ancestor of the Archer Houblon family (of Coopersale), to change his name to Archer; and in a deed connected with the change of his name, dated 1575, he is called Simon de Boys.[11]

1534.—Sir William Fitz William had six acres of meadow land in Theydon Boys.[12]

1594.—Norden, in his map of Essex (of which a copy was lately given in the ESSEX NATURALIST), spells the name Theydon Boys.

In the "Perambulation of Waltham Forest, Essex," in Charles the First's time (1642), the name is given as Thoydon Boys.[13]

There is no absolute certainty as to the pronunciation of a word by our forefathers some hundred years ago; but by comparing the sound of the letters where used in other words familiar to us, a conclusion may be drawn from analogy, probably not far from correct.

[8] The following words from Mr. Halliwell's Archaic Dictionary, having the word "Bosz" for their root, show the changes it has undergone. Bosc, *a bush*; Boscage, *a wood*; Boschayle, A.N., *a thicket or wood*; Bosches, *bushes*; Bosholder, *the chief person in an ancient tithing of ten families*; Boske, *a bush*. Bailey (Dictionary, 1742) has Boscus, *O.L., all maner of wood.* And there are several places in England, as Boscombe, in Hampshire and Wiltshire; Bosham, near Chichester, Bosheston, Pembrokeshire; having for the origin of their name the Teutonic word for wood.

[9] Morant's "History of Essex," Vol. I., page 162, note T.

[10] Morant's "History of Essex," Vol. I., page 158.

[11] Ogborne's "History of Essex," page 269. Mrs. Ogborne, in her "History of Essex," mentions that the founder of the family in England came over with William the Conqueror, and that his name was Simon de Bois or Boice. His grandson was Brian Boice, whose descendant, Bernard Boyce, through his marriage with the daughter and heiress of John Hallam, became entitled to estates in Theydon Garnon. He was the father of Simon de Boice, whose name was changed to Archer, and as he appears to have been the first of the family who came into Theydon, it could not have derived its family name from Theydon Bois. Nor could the manor have derived its name from the family, inasmuch as it had been known as Theydon Boys during the hundred years or more which preceded the introduction of Bernard Boyce, through his marriage, into the Manor of Theydon Garnon. But this entry has an interest, bearing upon the pronunciation of Bois; for the writer who entered the name of the first Simon de Bois, by the alternative spelling of *Boice*, appears to wish to convey the pronunciation of the name, and the clerk spelling the name of Simon de Boice in the deed of 1575, Simon de Boys, leads to the conclusion that at that date the combination of letters, although differing, had the same sound.

[12] Morant's "Hist. of Essex," Vol. I., page 160.

[13] Farmer's "Hist. of Waltham Abbey."

That the Norman word Boys was pronounced the same as the French Bois for "wood" is nowhere shown. It was probably used both in Flanders and in England, for in "The Visitation of London" (1633-34), under the name Dubois, is entered the following pedigree :—

Guylliam du Boys neere Lisle in ffanders

Jacques du Boys, neere Lisle who came ouer into England in the tyme of Persecution = Jane da of Gregory Matelyne of Ober neere Armenteers in the province of Lisle

= Peter du Boys of London Merchant now living 1634.

(Signed) PETER DU BOIS.[14]

Mr. J. O. Halliwell quotes ("Archaic Dictionary"), as illustrating the meaning of *Boys—wood*, the following lines from a Cambridge manuscript :—

"And bad them go betyme
To the *boys* Seynt Martyne."

In reading the lines, although "Boys" is not necessarily pronounced "Boice," the euphony points out that such was intended, for, if to be pronounced as is the French word for wood, the line would have been harsh sounding, and not such as a poet would have written.

In a manuscript about the middle of the fourteenth century are the lines :—

"Then com a Vois to Joseph.

. . . .

Thenne spekes a Vois to Joseph."[16a]

In the fifteenth century *oys* and *ois* were used when spelling cross :—

"And soffrede peyne and Passyone,
And on the Croys was I-done."

Fisher, Bishop of Rochester, 1459, spoke of "Boystous nayles of yren," when speaking of the crucifixion.[16b]

In a 1516 manuscript, "Josaphe of Arimathea" fastens on Evelaks shield "a Crois of Red Cloth."[16c]

The mode of pronouncing the *o* in cross and other words mentioned by Mr. Ellis, has no doubt authority in the ancient spelling, so that Boys as well as Croys may reasonably be supposed to have been pronounced with a prolongation of the sounds, not exactly two syllables, but the first letters *Bo* or *Cro*, with the long sound of *o* mentioned by Mr. Ellis as still belonging to modern pronunciation, gliding as it were into the sound of *ys* or *is*, as in oyster, hoist, boisterous, etc., and so producing the sound heard, when a resident of the parish of Theydon Bois pronounces the name as if spelt Boyce or Boice.

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[14] Harlean Society's Publications.

[15] Myer's "Instruction to Parish Priests," Early English Text Society, page 14.

[16] Early English Text Society's Publications :
(*a*) "Joseph of Aramathie," page 2.
(*b*) "Words of John Fisher," page 229.
(*c*) "Joseph of Aramathie," page 15.

As from time to time the sound of letters alters, and as writers make use of those letters which convey the sounds they hear, the manner of spelling words and names of places also becomes changed; and so in the sixteenth century the prolonged *s* is produced by *es*, and Theydon Boys is changed into Boyes, or the long *o* is expressed by the diphthong *oy* or *oi*, and *es* takes the place of *ys*, or *e* is added after the *s* to prolong the sound; later on the *s* becomes *c* with *e* added.[17]

In 1507, the name of a small manor in Navestock was spelt Boys, and in 1546 Boyse.[18]

1558—May 25th.—Licence to marry was granted by the Bishop of London to Richard Cutt, of Ryelinge, and Mary Elrington, of Theydon Boyes: to marry at Theydon, aforesaid.

1578.—Edward Elrington held Birch Hall, of the manor of Theydon Boyes, and he also held (land) in the manor of Theydon Boyes.[19]

By the end of the sixteenth century *oyce* was used to produce the same sound as *ois* had in the fourteenth century. In the verses already quoted, "Then com a Vois to Joseph," *voice* is spelt *vois*, and by Robert Crossley, who wrote 1559-1567, it is spelt *voyce*—"The Voyce of the last Trumpet," in "The Yeoman's Lesson":—

"For Christes shepe do hear hys voyce
Whych biddith the worke busily
Sixe days, and in the seuenth reioyce,
And geue somewhat to the nedy."

1605.—May 30th.—The Bishop of London granted licence to marry to Thomas Greene, of Witham, county Essex, husbandman, and Dorothy Gartwood, of Theydon Boyce, said county, spinster, daughter of Richard Gartwood, late of Witham aforesaid, husbandman, died at St. Magnus, London.

1661—September 19.—James Holloway, of Thoydon Boice, Essex, gentleman, bachelor, about 32, and Margaret Smyth, of St. Bartholomew, Exchange, London, spinster, about 26, her parents dead; at St. Mary, New Fish Street.[20]

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[17] Alexander Hume, in his "Orthographie and Antiquity of the Britain Tongue," written in the first quarter of the seventeenth century, after mentioning that we sound *c* as *s*, says, "And if it ends the syllable, we add *e*. But neither for the idle *e* nor for the sound of *s* have we any reason." —*Early English Text Society's Publications.*

[18] Morant's "History of Essex," Vol. I. Under Navestock.

[19] Morant's "History of Essex," Vol. I., page 162.

1671-2.—Edward Harris, of Epping, Essex, gentleman, and Mrs. Mary Willson, of Thoydon Boyce, said county, spinster, about 26, and at her own dispose; at Thoydon Boyce aforesaid.[21]

Morden, in his map, published in Gibson's edition (1694), of Camden's "Britannia," spells the name Theydon Boies—*oi* has now, and had in the seventeenth century, a softer and more lengthened sound than *oy*—as in boil, toil, soil, etc.; and the letters he used no doubt conveyed to him and the editor the sound they heard when the place was mentioned. I have pleasure in presenting a reprint of this map of Morden's to the members of the Club, as an accompaniment to this paper. Bowen, in his map of Essex, about 1719, retains the old form of spelling, viz., Boys.

The consideration of the different modes of spelling Theydon Bois, when connected with the local pronunciation of the name, leaves but little room, if any, for the supposition that "Boys" or "Bois" is derived from the French word for wood; but it leads to the conclusion that the name had its origin in the Teutonic language spoken by the owners and the cultivators of the land at the time of the Norman invasion, and continued to be the language spoken by the agricultural population; finally developing into the English language now spoken by their descendants. The Teutonic, and not the French, pronunciation of the name has evidently been handed down through very many generations to the present time, and is the same as that expressed by the letters Boyce, or Boice, or Boyse,[22] nearly three hundred years ago, as well as now. The spelling (Bois) now in use is unfortunately the same as that of the French word for wood. And, although it may be pronounced Böis (like Däis), giving the long sound to the *o*, as there is no indication, as the name is now written, that such a pronunciation is intended, it may be expected that those unacquainted with the local pronunciation, would give to it the French sound, and so lead to misunderstandings. This did occur last summer. A passenger who wished to go to Theydon Bois had asked for a ticket to the station, giving the French pronunciation to the word Bois. He was heard denouncing to his companions, in no measured terms, what he called the gross ignorance of the ticket clerk. After the word had been repeated several times, the clerk said, enquiringly, "You mean Theydon *Boice?*" and gave the ticket accordingly. It is no doubt undesirable to change the spelling of a word or name of a place; but as "Bois" does not at present represent the name of Theydon Bois, as pronounced a little alteration in the spelling should not be objectionable. Such an alteration in the spelling, consisting as it does in only introducing an *e* between *Boi* and *s*—or by putting two dots over the *ö* (as Böis)—would not be great, and it could be readily made in the railway time tables, notices, etc., and at the railway stations, as well as in the letter headings of the inhabitants. It would do away with the supposition that "Bois" is to have given to it a French pronunciation, and it would, moreover, make the spelling convey the sound of the name.

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[20] and [21].—Marriage allegations in the Registry of the Vicar-General of the Archbishop of Canterbury.—*Harleian Society's Publications.*

[22] "Boys" would now be pronounced in Flemish as if spelt "Boyse."

Robert Morden's Map of Essex.

[The Map which, by Mr. Winstone's continued kindness, we are able to send out with this part of the Essex Naturalist, is a facsimile of one of the series of maps of the counties of England given in Gibson's edition of Camden's "Britannia," 1695. We are sorry to say that up to the time of writing we have been quite unable to glean any particulars of the life or work of this "Robert Morden," and can only let the map tell its own story. Any information about the draughtsman will be very welcome for publication at a future time.—Ed.]

Bees at Field Beans.—The hive-bees have been very busy this spring gathering nectar from the purple spots on the stipules at the base of the leaves of the field-bean (*Vicia faba*). They visit the beans long before the flowers are out, and judging from their eagerness and from the exudation of nectar visible to the naked eye on the purple spots, the quantity of honey (?) gathered from this source must be considerable. Of what use can these nectar-producing organs be to the bean-plant?—Reginald W. Christy, Roxwell, June 17th, 1887.

Green Tree Frogs (*Hyla*) **in Epping Forest.**—On the 6th of May, a very loud croaking was heard in a swamp at the back of the Infant Orphan Asylum, Wanstead, and on the 10th of May, Mr. S. H. Corlett, of Hermon Hill, went up to his waist in the water, and after a long search he managed to secure a Green Tree-frog (*Hyla arborea?*), leaving another in the swamp. I wrote to Mr. Bartlett, of the Zoological Gardens, offering the frog, and he replied that many were annually imported into this country. There are plenty at the gardens, and they have succeeded in keeping several at large for some years. He thought that, if the frogs were not disturbed, they might breed in the forest, as *Hyla* was well able to withstand the winter frosts of this country. It is therefore to be hoped that if any are found by others interested in natural history, they will endeavour to prevent the frogs being disturbed.—W. G. Macmurdo, "The Ferns," Wanstead, June, 1887. [We would venture to hint to our correspondent that if the frogs are taken out of the pond, there will be none left, disturbed or undisturbed.—Ed.]

BIRD HARMONIES.

By F. CARRUTHERS GOULD.

[*Being abstract of a Lecture delivered before the Club, April 30th, 1887.*]

HARMONY runs throughout the whole of nature, and it has many phases. The most palpable to an ordinary observer is that of colour, and it is one which appeals to all who are not blind physically or mentally.

But there is another harmony, not so palpable as that of colour, because more subtle, but none the less existing. It is the harmony between the animate and the inanimate; between the mountains and valleys and streams and ocean, and the little worlds of living creatures which live, and move, and have their being in this same universe as ourselves.

I am looking at this subject merely from a sentimental point of view, and not in the least scientifically. Of course this harmony may be easily explained in a great measure by assimilation of colouring for protective purposes, or by protective resemblances, and I may be arguing in a circle; but I ask my readers to pardon me for leaving the rigid path of technical accuracy and wandering through the more picturesque windings of fancy. I am treating my subject more from the point of view of Michelet than of Darwin.

Now amongst the different worlds of living creatures which make up the animated part of nature, I think there is none more attractive, more harmonious than the bird world.

Its beauties and varieties of form and colour, and its power of flight, have from time immemorial given to the bird a peculiar charm in the eyes of men, who have used it in its varied forms as types of peace and war, of love and hate, of ambition and daring, and other things with which man is ever busy.

And so closely and so perfectly do birds harmonize with nature that the very names of some bring vividly before the mind the seasons with which they are associated. The nightingale means the spring and the moon-lit nights in May; the skylark makes us dream of summer skies; the blackbird and the robin recall to our memory the rustling of autumn leaves and the snows of Christmas.

What wonder is it that we love our little feathered friends? First our nursery tales cast a halo of romance about them, as in the old story of the Babes in the Wood and the Robins. And then in our schooldays, even in the dry regions of classics, we came upon the quaint fancies of Ovid with his metamorphoses; of Cygnus and Halcyone and the rest, who for sins or sorrow were changed into birds, swans, kingfishers, cormorants, and so on. There was a good deal of nature shining through the fancies of the old Pagan poets. Birds are indeed, in short, the winged voices of nature; and they are about us everywhere, in the old world and the new, in the busy streets of great cities, and in wastes untrodden by man.

If we climb the mountain top, we hear the scream of the eagle; the woods below ring with melody; in the marshes we hear the plaintive cries of the peewit and the curlew; the wet sands on the ocean fringe are alive with sandpipers; and out at sea are all the winged fisher folk, gulls, terns, cormorants, and divers both great and small.

If then we are to find harmony anywhere existing between the animate and the inanimate parts of nature, we shall find some of its most perfect chords in the bird world.

Now let us picture to ourselves one of those scenes of wild grandeur which are found amidst the precipices and crags of a mountain range. Above us the huge wall of rock rises in a sheer precipice to a giddy height, weather worn, and seamed with the scars of centuries of storms, and below is an awful succession of chasm, ledge, and steep grassy slope, with here and there a stunted, wind-twisted pine, clinging as if for very life to its scanty hold.

The scene is grand, but it is the sublimity of desolation. Life seems out of place in such a solitude. Yet even in this desolation living nature has its harmony with the dead. There is life here, for suddenly we hear a wild scream which echoes through the silence, and from under an overhanging cliff beneath us sails out a great golden eagle, with mighty weather-beaten wings. She has left her brood of hungry little eaglets in their nest on a ledge, where the rock overhangs and protects it, and she is looking for her mate, for the larder is empty. Another scream, and then there comes an answer ringing down from the crags above.

There he sits on the top ot a jagged pinnacle of rock on the serrated edge of the skyline.

> "He clasps the crag with crooked hands;
> Close to the sun in lonely lands,
> Ring'd with the azure world, he stands."

Look at him now, his wings a little opened and his fierce head bent forward as he answers the cry. Could any living creature be more in unison with the scene below? Destruction is written in every line of his flat, cruel head, and his fierce eyes and his clutching talons. As he stands there preparing himself for flight, he is like the Spirit of Death presiding over Desolation.

We talk of the eternal fitness of things, can it be more strongly exemplified in Nature than here? Imagine any other bird sitting on that pinnacle of rock; say a turkey cock trying to preserve his centre of gravity, and at the same time to display his tail to the elements—fancy hearing his pompous bubbly-jock clatter instead of the wild scream of the eagle! Or imagine a peacock up there with nothing to look at and admire him, or indeed any other bird beyond the vulture and hawk tribe. The two eagles wing their way together on their errand of blood, and we pass down to the heather covered moor at the foot of the mountain. The soft, springy carpet of heather, over which the wild bees are busily humming in the sunshine, is rich with colour; purple and pink, with the dark green of the undergrowth, where the bilberries nestle; and green and gold with gorse. There is life here too, for a frightened rabbit scuttles away before us, and then a little brown weasel crosses the path, and after a moment's startled gaze at the intruder he gallops away.

Presently we are startled by a sudden whirring of wings and a sharp "Coq-coq-coq!" and glancing round we see a little group of red-brown birds, mottled and barred with darker brown, flying along with strong, heavy, noisy flight just above the heather tops, and skimming over the shoulder of the hill, they disappear. These are grouse, the Red Indians of the moors. Nature has been kind to her children, and has plumed them with the colours of the heather stems and sprigs, and they can lie amidst the undergrowth almost invisible. Next we put up a grand old blackcock, who protests against our presence by an indignant "Birr-birr-bick." He is the bird king of the heath with his small game looking head, a brilliant scarlet patch over his bright sparkling eye, clothed in glossy feathering purple in the light, and velvet black in the shade, with white barred wings and a tail with double curves.

These are the spirits of the moorland, as the eagle is the spirit of the mountain top. We cross the moor, and descending the gradual slope pass down through a fir wood with the sound of running water near us, and at last we come out on a patch of marshy ground with a beautiful loch stretching away directly before us, enclosed to right and left by walls and slopes of rock, fringed at the foot with green and sedgy shallows. Away in the purple distance the loch ends with a wood, and to our left is a little stream stealing quietly through tangled flags and rushes, to riot further away down the valley amongst the boulders and shallows of its rocky bed. Further still on our left where the grass land rises somewhat, are the ruins of an old castle with quaint gable ends, its base covered with ivy.

The loch is as smooth as a mirror, and like a mirror reflects the rushes and rocks and sky; this reflection every now and then being broken here and there when a gust of wind comes rippling along, or when a fish leaps, and then the edges of the mimic picture for a few minutes are jagged and quivering. It is a beautiful solitude, and we look around for the life. There it is, as perfect an embodiment of the spirit of the scene as it is possible to conceive. A tall blue-grey bird with black tipped wings, his long white-lined throat spotted with black, doubled back on his breast. His head plumed with black, and the long yellow bill resting on the neck, yellow eyes gazing intently downwards, apparently at his own reflection. He stands as motionless as if he were only a painted heron. The neutral tints of his plumage make his figure stand out clear and sharp against the surrounding browns and greens of rock and marsh; and there is a pensiveness apparently in his quaint pose which brings him, as it were, into the same key as that of surrounding nature.

Then we pass on down by the river side as it runs towards the sea. In the woods we hear the tapping of the woodpecker on the hollow beech tree, and, if we are fortunate, we get a glimpse of his green and gold plumage as he flies across a glade. The jays are screaming all round us and flitting from tree to tree, and from the depths of the wood comes the soft crooning of the wood doves.

Further down, where the river runs through the marshes, we see flocks of peewits, green-backed and plume-crested, hovering and wheeling, now flashing in the light as they turn their undersides towards us, and then suddenly, as they turn again their black and green backs, are shadowed into a dark moving mass of specks. Away in the distance from over the sands come the plaintive cries of the curlew.

It appears to be one of the elements of natural harmony that the voices of birds should be pitched, to use a musical simile, in the same key as the scene where they are mostly heard. There is a wild plaintiveness and an undertone of sadness in the cries of the birds which are the life of the solitudes and wastes of nature, very different from the joyous carolling of the merry woodland tribes; as if the spirit of the nature around had entered into and found a voice through them.

On the wet sands close to the edge of the ebbing sea, there are busy hosts of sea snipe and other little waders, busy with the "flotsam and jetsam." Out at sea we catch a glimpse of gracefully wheeling gulls, and the long black piratical looking cormorants, flying low with straight strong flight. On the cliffs of the headland are rows of quaint little puffins and guillemots, and all the fisher folk are filling the air with wild harsh cries. And there is the life of the night as well as of the day. The owl is the type of the former, as the swallow is of the latter. The owl, ghostly looking, with soft downy feathers and noiseless sweep of wing; the swallow, burnished like a little machine, with swift arrowy flight, cutting through the air as if his wings were scimitars. These are only a very few notes out of the great symphony of nature.

If we take the great brown and grey eagle on the crag of brown rock amidst the grey mountain mists; the white ptarmigan amongst the snowdrifts, or the heather-coloured moorfowl on the moorlands; the black and grey and silver heron in the silvery shallows of the loch or river side; the brown and white sandpipers at the edge of the brown sand and the white water fringe; the green-backed peewits on the marshes; the grey and white gulls on the white-flecked sea; the swarthy cormorants on the dark jugged rocks; or if we take the ghostly white owl with his downy wings flitting through the darkness; the twittering swallows and swifts darting to and fro in the bright sunshine, or the lonely bittern crouching amidst the rustling dogbent and rushes of the desolate fens; in all these pictures we may see that there is most true harmony between the animate and the inanimate parts of nature.

The plate which accompanies this epitome of my lecture explains itself. Each of the several scenes of nature—the mountain, the moor, the lake, the woods, the marshes, the sands, and the sea cliffs, is suggested with its appropriate types of bird life. The central drawing illustrates a not uncommon incident; a white owl has been caught napping in the daylight, and the swallows are hunting the ghostly bogey-looking night creature away into his proper place amongst the bats and cobwebs.

[The photo-etching was kindly prepared for and presented to the Club by Mr. Gould.—Ed.]

BIRDS AND THEIR HAUNTS.

Inula helenium, Linn., near Fyfield.—Has the Elecampane been recorded from the Fyfield district lately? I found a fine specimen on August 1st, between Fyfield and Willingale, and thought that it might be worth noting.—R. PAULSON (*Hackney Nat. Hist. Soc.*), August 3rd, 1887.

Essex Alga.—While fishing in the ponds near Forest House, Leytonstone, I found floating about among the weeds considerable quantities of a coloured alga, which I take to be the *Pleurococcus roseo-persicinus* of Cooke. This plant has, it appears, received no less than eight different names from different authors. It is described and figured in Grove's "Synopsis of the Bacteria and Yeast Fungi," and named there *Cohnia roseo-persicina*, and classified with the Schizomycetes.—ALFRED P. WIRE, Harrow Green, August 2nd, 1887.

Stone Mites (*Petrobia lapidum*, Koch).—The tiny eggs of the stone-mite may now be found in countless numbers on stones and other substances lying on the numerous pieces of waste ground all around Leyton, Essex. These eggs, which are about the hundredth part of an inch in diameter, are very pretty objects when examined under a microscope. They are disc-shaped, and lie horizontally on the stones generally in rows or lines, the lower side of the disc being elongated downwards and contracted to a foot, which is cemented to the stone. The upper part of the egg forms a lid which is easily detached. This lid is circular, and reminds one of an old shield with a boss in the centre and radiating indentations all round. On bruising the eggs a blood-red liquid exudes and stains the stones and fingers. —ALFRED P. WIRE, Harrow Green, August 3rd, 1887. [This mite was formerly called *Trombidium* or *Tetranychus*, but was formed into a new genus, *Petrobia*, by Mr. Andrew Murray ("Economic Entomology, Aptera," page 118). The fairy-like eggs have often been observed, and are figured in Loudon's "Magazine of Natural History," and in "Science Gossip" for 1867, page 126. When first hatched out of the eggs the mites are little red six-legged creatures, but afterwards become eight-legged. In the south of France Dugés found it in families in the light down which clothes the underside of the leaf of the plane-tree. In autumn he found it under stones in the public walks, in entire families, which led him to think that, at that season at least, it quitted the trees in order to multiply more securely. See also "Entomologists' Monthly Magazine" for 1864-5, and 1867-8, for interesting details. We shall be glad to know whether the eggs or mite have been noticed in abundance this year in other parts of Essex.—ED.]

Woodcock (*Scolopax rusticula, L.*) **Nesting in Epping Forest.**—Although these birds are not unfrequent visitors to the Forest in the winter months, the absence of springs, and the hardness of the soil are unfavourable to them, and they are never numerous where cattle have access. They do not therefore generally remain long, but as remarked by Mr. E. N. Buxton ("Epping Forest," p. 98), instances have been known of their staying through the summer, and breeding. On the 6th April last, when accompanying Mr. Buxton in pursuit of jays (whose numbers in the interest of other birds required thinning), four woodcocks were flushed in different parts of the forest, possibly one of the birds may have been moved twice, but having regard to the date, this augured well for their remaining to breed, and it was with much satisfaction that, so lately as the 6th August last, when out with the members of the Club, I had ocular proof that at least one brood had been reared in the Forest this summer. While walking at twilight in the neighbourhood of the Loughton Camp, I came suddenly upon an old woodcock and two full fledged young ones. They all rose at my approach within a few yards of me, but the young ones not being strong on the wing, dropped again within a very short distance, and very likely might have been caught without much difficulty. The old bird on rising crossed in front of me, and fluttering along the ground, acted the part of a wounded bird to perfection, in her attempt to distract my attention from her young. Twenty yards further on a roe deer sprang up from some thick cover, and quickly dashed away, and in the stillness which succeeded the crash of dry fern, heather, and underwood, the curious jarring notes of the goatsucker or nightjar were distinctly heard. Such rural sights and sounds as these so near London were as remarkable as they were gratifying.—J. E. HARTING, August 11th, 1887.

THE ESSEX FIELD CLUB.

Field and Ordinary Meeting in Epping Forest,

Saturday, August 6th, 1887.

An assembly of the Club was called at about half-past three at Theydon Bois station, and a pleasant ramble was taken thence through Genesis Slade to Ambresbury Banks, by Monks Wood, and so to the Loughton Camp. Keeper Butt very kindly proposed to devote a deserved half holiday to the task of leading the party through the woods. In traversing the "slade" two fine fallow bucks were put up. The temperature was almost tropical, albeit somewhat lowered in the open by a refreshing breeze, and the forest everywhere exhibited signs of suffering under the great drought which so markedly characterises the present summer. Many plants much dwarfed in habit were seen, and attention was specially called to miniature specimens of *Erythræa centaurium* (Centaury) and *Achillea ptarmica* (Sneeze-wort) in full bloom, but not one third of their usual height; while in the opens the Birdsfoot Trefoil (*Lotus*) was flowering profusely, although scarcely able to lift itself above the level of the parched sward. Literally nothing could be done in the collecting of mollusca to show at Mr. Harting's demonstration later on—the ponds were dry, and the woodland snails had buried themselves deep under the leaves and in the thickets, awaiting the wished for showers before showing a tentacle. A good many of the commoner lepidopterous insects were observed. On the heathy places the "Small Copper" (*Polyommatus phlæas*), the "Common Blue" (*Lycæna icarus*), and the "Small Heath" (*Cœnonympha pamphilus*) butterflies were flitting around gaily, specimens of *Eubolia plumbaria* often started up wildly from the disturbed ling, and at the bramble blossoms dozens of worn individuals of the plebeian butterflies, *Epinephele ianira* ("Meadow Brown") and *tithonus* ("Large Heath") held carnival. In the open glades the "Peacock" (*Vanessa io*), the "Admiral" (*V. atalanta*) and "Tortoiseshells" (*V. urticæ*) were seen. In the changeful light of the thickets, half shade, half sunshine, the pretty "Speckled Wood" butterfly (*Pararge egeria*) floated through the air; the sunlit outskirting holly bushes were enlivened with the gambols of the well-named "Azure Blue" (*Lycæna argiolus*), and high over the oaks soared the resplendent little "Purple Hair-streak" butterfly (*Thecla quercus*) quite out of reach of the collectors' nets. As we tramped through the fallen leaves in the beech woods great numbers of the bold and handsome "Yellow Underwings" (*Triphæna pronuba*) were dislodged, and all over the forest and the country generally one could not but be struck with the more than usual profusion of the "White" butterflies (*Pieris brassicæ* and *rapæ*), while specimens of *Porthesia similis* (*auriflua*), *Eugonia quercinaria* (*angularia*) and *Calymnia trapezina* forced themselves on the attention of even the non-entomological.

The dryness of the season is rendering possible numerous and in some instances disastrous forest fires. Just as we quitted Ambresbury Banks, smoke was noticed in the direction of Theydon, and on hastening to the spot an immense fire was discovered raging in the heathy birch coppice on the left-hand side of the road leading from the "Wake Arms" to Theydon. Many of the members aided the efforts of the keepers and others to beat out the fire, but the number of willing hands available was too small; water of course there was none, and little could be done spite of the most strenuous exertions.[1] The *feræ naturæ*, the birds and insects were quickly driven out by the smoke and heat; two baby Nightjars(*Caprimulgus*)were rescued as they lay helpless on the ground, the mother watching and following them as they were carried to a place of safety, and a deserted pheasant's nest containing five eggs was noticed just on the confines of the fire. It was curious to see the great numbers of grasshoppers which were steadily leaping out of danger before the advancing flames. Our obliging guide, Keeper Butt, lost his holiday, as inclination and duty of course compelled him to remain with his fellow keepers to encourage and direct the efforts of the corps of beaters. Some of our members were much smoke begrimed and scorched, and we were glad after a time to beat a retreat to our rendezvous at the British (or Cowper's) Camp at Loughton, noticing on the way many Green Woodpeckers and Jays. On the camp a marquee had been erected by our excellent caterers, Messrs. Riggs and Sons, of Chingford, and the cool provisions and cheering tea were highly appreciated after the great heat, natural and artificial, of the afternoon's walk. Another forest fire was burning at the eastern end of the camp, which called for renewed exertions on the part of some of us, and we were told of a third near the "King's Oak" at High Beach.[2]

After tea an Ordinary meeting (the 79th) was held, Prof. R. Meldola, F.R.S., Vice-President, in the chair. Messrs. Hermann Cohn, Robert Lodge, and Robert N. A. Wallinger, were elected members of the Club. An address on the methods of Collecting and Preserving Land and Freshwater Mollusca, of which a summary is given at page 169, was then delivered by Mr. J. E. Harting, F.L.S., F.Z.S. (*Editor of the "Zoologist"*), who illustrated his remarks with a large diagram showing a scheme of arrangement of the families and genera, and a series of specimens of British species contained in glass-topped boxes.

A hearty vote of thanks to Mr. Harting was carried on the proposal of the Chairman and Mr. Walter Crouch, and a few observations made by members present relating to the subject of the address will be found appended to it at page 175. A walk to the Loughton Station through the deepening twilight in the woods concluded a pleasant meeting.

Dicycla oo, L., in Epping Forest.—I have taken a nice series of *Dicycla oo*, at "sugar" in Epping Forest, including a fine dark specimen, the first capture being on July 12th. I have also taken *Eurymene dolobraria, L.*, on the Forest. —CHARLES OLDHAM, Woodford, July 25th, 1887.

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[1] This became one of the most serious fires that has occurred for years. It was burning fiercely all Saturday night, and was still smouldering on Sunday evening; the keepers and watchers were out all night in endeavouring to restrain the mischief. A very large extent of beautiful heathy ground has been destroyed, and hundreds of young birches killed. The grievous damage done (spitefully and revengefully done it is feared) has roused a deep feeling of regret and indignation in the district.

[2] There can be little doubt but that some at least of these fires are caused wilfully, and we had almost ocular proof of this. We entered Cowper's Camp at the north-eastern corner, and certainly no fire was then to be seen at that spot. About ten minutes afterwards two of our party retraced the route to look for a member who had lost his way, and were astonished to see in the close thicket of one of the small hollows just outside the camp an incipient fire of a dozen yards or so in circuit, which was of course quickly dealt with and extinguished. The spot was away from the path, but visible from it, and no fire or smoke was there a few minutes before, and we could not help connecting its outbreak with three hobble-de-hoy species of the *genus* "cad," who had passed us on our first entrance into the Camp. The Superintendent of the Forest has offered a reward of £20 for the detection of any incendiary, but that is not enough; a large reward, say £100, should be freely advertised, and some mounted detectives placed on duty to catch the evil-doers in the act; above all, every effort and watchfulness should be exercised by all well-wishers of the forest to aid the authorities in ascertaining and punishing the perpetrators of these dastardly crimes.

LAND AND FRESHWATER MOLLUSCA, AND THE METHODS OF COLLECTING AND PRESERVING THEM.[1]

BY J. E. HARTING, F.L.S., F.Z.S., ETC., *Editor of the "Zoologist."*

[*Read at the Field Meeting in Epping Forest, August 6th, 1887. See page 167.*]

AMONGST the many beautiful objects in nature which claim the attention of field-naturalists, some may be said to force themselves upon our notice, while others require to be carefully looked for.

In the one category we have familiar examples in most wild flowers, in brightly coloured fungi, in butterflies, and in birds, which attract us by their notes, by their striking plumage, or by their peculiar mode of progression, whether on foot or on the wing. In the other category we may certainly place most of the land and freshwater Mollusca, and all of the aquatic ones. I say *most* of the terrestrial species, because there are a few, like the common Garden Snail (*Helix aspersa*), whose size and motion betray them, and others like the Heath Snail (*Helix ericetorum*) and the Zoned Snail (*Helix virgata*) which are so common in exposed situations, as on open downs and heaths, that they cannot well escape notice. But as a rule their comparatively small size, retired habits, and general resemblance in colour to their natural surroundings, render the majority of land mollusca inconspicuous; whilst the aquatic forms, from the very fact of their living in water, or mud, or on the leaves of aquatic plants, may very easily be overlooked if not specially searched for.

It is, perhaps, chiefly for the reasons stated that the study of the Mollusca has been hitherto somewhat neglected by the members of the Essex Field Club;[2] although for aught I know to the contrary, there may be several assiduous collectors already engaged in investigating this particular branch of Natural History within the area of the operations of this Society. If so, I need only express the hope that they will continue their investigations, and by the friendly co-operation which happily characterizes these pleasant field meetings, aid in the preparation of a catalogue of the Essex Mollusca which may be not only of special interest to this Society, but useful to conchologists in other parts of the country.

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[1] The object of this paper is to attract attention to the Mollusca of the County, and to induce Members to commence gathering and studying them, with a view to the publication of the results. Beyond Mr. Laver's careful paper on the "Land and Freshwater Mollusca of the district around Colchester," in our "Transactions" (Vol. ii., pp. 88—97), and Mr. Christy's notes on white varieties of *Cochlicopa* and *Bulimus* (Proc. iii., xciii.) nothing of importance has been *published* respecting the Mollusca of Essex, although we have reason to think that a good deal of material has been collected by several members and others. Mr. Harting has undertaken to draw up a list, etc., of the Mollusca of the Forest district, as announced in ESSEX NATURALIST (*ante* p. 115), and will be very glad to receive specimens (*with notes of precise localities and habitats*) and any lists or other information, addressed to him at the British Museum (Natural History), Cromwell Road, South Kensington, S.W. Mr. Walter Crouch, "Grafton House," Wellesley Road, Wanstead, will likewise be glad to receive specimens for identification, more particularly from the Becontree Hundred. Specimens or lists can also be forwarded to the Hon. Secretary of the Club. Intending helpers are reminded that *autumn* is the best time to collect land-shells, as they are then mostly full grown, and with their tints rich and unfaded. A few hints as to useful books of reference are appended to Mr. Harting's remarks.—ED.

[2] The author had overlooked Mr. Laver's paper, referred to above.—ED.

Those who have already taken up the subject will doubtless have become sufficiently interested in it to require no further stimulus from any observation that I can now offer; but on the other hand there may be some to whom the subject is altogether new, and who consequently may be glad to receive a few hints to enable them to make a start as collectors and students of a most interesting class of animals.

One great difficulty which attends the collection of marine shells will not arise here. Amongst the Marine Mollusca, the number of species is so enormous, and the difficulty of obtaining them (except by purchase) is so great as to deter many people from attempting to collect them.

Now the number of British Land and Freshwater Mollusca is comparatively limited. Roughly speaking there are only about 120 species, excluding such as have been evidently introduced, or described as British on insufficient authority, but including the slugs, which though generally regarded as shell-less, have the shell either rudimentary and of an indefinite form, or shield shape placed beneath the mantle. Of these 120, about 75 are terrestrial, and 45 aquatic. It is of course, to be understood that in speaking of them as British, it is not to be implied that they are not found out of the British Islands. The majority are commonly distributed over the north of Europe, while many are found not only in Southern Europe, North Africa and Asia Minor, but even in Siberia and the northern parts of Asia and America.

To get a general idea of some of the commoner forms of shells the subject is at once simplified by dividing the whole number of species into two classes, the BIVALVES (*Conchifera*) of which the common mussel furnishes an illustration, and the UNIVALVES (*Gastropoda*) of which the garden snail is a familiar example. Amongst the aquatic shells there are both bivalves and univalves, but with the terrestrial species only univalves occur. The reason for this is to be found in the difference of structure which exists in the animal itself, particularly in the organs of respiration, and which enables one species to breathe and live where another would die.[3]

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[3] Mr. Harting here gave some details of the classification of the British species, but this would best form the subject of a separate paper.—ED.

If we examine carefully a handful of different univalves, we shall find that as regards the external appearance of the shell, they are all more or less modifications of one type. Take for example the shell of the common garden snail, belonging to the genus *Helix*, and imagine it to be in a soft and plastic condition, capable of being modelled. By a little manipulation, elongation and compression, we can so modify the shape as to cause it to resemble in turn examples of many different genera—*Paludina*, *Limnæa*, *Bulimus*, *Pupa*, *Clausilia*, *Planorbis*, *etc.*, and as a sort of *memoria technica*, this may serve at starting to help us to distinguish these genera and remember their names.

By degrees we shall discover that each has its characteristic habitat in which, in many cases at least, a peculiarity of shape or colour tends to favour its concealment. The shells of the genus *Clausilia*, for example, so closely resemble little rough excrescences on the bark of trees to which they are found adhering, that it requires a practised eye to detect them. Some of the species of *Pupa* to be found amongst moss and general *débris* at the roots of trees, are so like a chrysalis, that at first sight they might be mistaken for one; while the flattened coil shells belonging to the genus *Planorbis*, have such a similarity to worm-casts that have subsided, as on that account almost to escape notice. Land shells are most abundant on limestone soils, which are most congenial to their existence, for the shell is composed almost entirely of carbonate of lime. The plants upon which these molluscs feed, are the sources whence the mineral matters are derived, and plants growing on calcareous soils contain proportionately a larger amount of salts than those affecting clayey or sandy soils, and are therefore in greater request. So also many species of horse-tail (*Equisetum*) and grasses, which contain a large percentage of earthy salts, are, on this account, much frequented by land snails. Most of the terrestrial mollusca love concealment, and to a certain extent moisture. In dry weather they are to be looked for in damp situations under stones, and logs, fallen branches of trees, and at the roots of moss. After rain these molluscs may be found crawling over the moist surface of tree trunks and palings, or like the rock snail *Helix lapicida*, on rocks, ruins, or ivy covered walls.[4]

[4] Prof. R. Tate makes some suggestive observations ("Collecting Natural History Objects") as to the localities and habits of certain species:—"Our steps are directed inland, and as we proceed the hedgerows, mossy banks, and margins of watercourses were diligently searched, finding a *Helix* here, a *Pupa* or a *Succinea* there. Gaining the woods, we turn over the damp

Amongst the aquatic species some, like *Unio* and *Limnæa*, affect the mud at the bottom of rivers and ponds; others, like *Neritina*, prefer the gravelly bed of a stream, or attach themselves to stones like the fresh-water limpet *Ancylus*, or to the underside of the leaves of aquatic plants like *Physa* and *Succinea*.

These can only be collected with a small dredge or landing net. With a little muslin bag upon a brass ring six or eight inches in diameter, fixed at the end of a fishing rod, a great variety of species may be brought to land. As many of them have very thin delicate shells, they require to be handled with great care, and should be placed with a little cotton wool in pill boxes or chip boxes, on the lid of which may be briefly noted in pencil the habitat and date. Afterwards, when the species has been properly identified, the scientific name may be added.

As to the mode of preparing specimens for the cabinet, the animals should be killed with *boiling* water, in which some common salt may be usefully dissolved, and removed carefully from their shells by the aid of a bent pin or similar contrivance. Those which on death retire too far into their shells to be reached by this ordinary expedient, such as *Clausilia*, *Bulimus*, and others, may be killed by placing them in tepid water, and adding gradually hot water; the animals may then be partially removed. The shells should be well dried to remove the moisture and harden the soft parts remaining; but the heat must not be too great, or else the shells will be discoloured, and rendered liable to be broken; and, further, the specimens should be well dried before placing them in the cabinet, which should be in a well ventilated place, free from damp; for the freshness and beauty of shells are apt to be lost by the growth of fungi upon their surfaces. In cleaning the shells of some species, such as *Helix hispida* and

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leaves, grub under the clumps of ferns and wood-rushes for small *Helices*, *Pupæ* and the like; scan the trunks of the trees for climbing *Clausiliæ*, *Bulimi*, and *Helices*, not unmindful that each little dirt-like mass is probably a *Bulimus obscurus*, which by covering its shell with mud, thus exhibits a protective faculty, and often escapes detection. Raising the rotting bark for *Balia;* lift the stones at our feet or roll away a log for *Helicella* [*Zonites*] and other small shells which usually live in such situations." It may also be worth while to quote the following passage from Dr. James Lewis's "Instructions for Collecting Land and Freshwater Shells," issued by the Smithsonian Institution (Washington, U.S.A.):—"In and around dilapidated buildings, where fragments of bricks and mortar cover the ground, large numbers of the smaller species of *Helix*, *Pupa*, *Carychium*, *etc.* [of course he is referring to the American fauna] will be found. They adhere to the under surface of a porous brick in preference to a fragment of gneiss, limestone, or other rock. Also the cavity of a decayed tree or stump, when examined in the early days of spring, will reward the searcher abundantly. Rich harvests may also frequently be gathered by laying boards upon the grass or ground, wetting them previously, unless immediately after rain. On taking them up after a night's exposure, large numbers of shells will often be found attached to the under surface." Mr. Laver has referred with approbation (Trans. E. F. C. ii., p. 94), to the plan of sifting leaves and rubbish from damp places in woods in a brisk current of wind, spreading the heavier portions left over white paper, and thus easily detecting small species of shells, which would otherwise be overlooked.—ED.

H. sericea, great care is needed, so as not to remove the delicate hairs or bristles which clothe the surface of the epidermis (or *periostracum*), a layer of animal tissue with which the shells are covered. Care must be taken also to preserve the *opercula* of such genera as *Paludina* and *Cyclostoma.* The operculum should be detached from the "foot" of the snail, the interior of the shell plugged with cotton wool, and the operculum gummed down in its natural position.

The shells of mussels and other bivalves which gape a good deal after the animal has been removed, should be carefully closed and bound with thread until dry. Bivalves as small as *Sphærium corneum* may be treated in this way, but the smaller species of *Pisidium* and some of the smaller univalves, as, for instance, the little sedge-shell *Carychium minimum*, may be dried in hot sand. Care, however, is required in the process, since too much heat will cause a transfusion of the carbonaceous matter of the animal into the substance of the shell, and so discolour it.

Slugs require a different treatment. On this subject, Mr. Tate, in his "British Mollusks" says, "as regards the internal shell it may be obtained by making a conical incision in the shield, taking care not to cut down upon the calcareous plate, which can then be removed without difficulty. The *animals* can only be conserved by keeping them in some preservative fluid; but the great object to keep in view is to have the slug naturally extended. Most fluids contract the slugs when they are immersed in them. A writer in the NATURALIST gives a process for the preservation of slugs, which he states to answer admirably, and to be very superior to spirit, glycerine, creosote, and other solutions:—'Make a cold saturated solution of corrosive sublimate; put it into a deep wide mouthed bottle, then take the slug you wish to preserve and let it crawl on a long slip of card. When the tentacles are fully extended, plunge it suddenly into the solution; in a few minutes it will die, with the tentacles fully extended in the most life-like manner, so much so, indeed, that if taken out of the fluid it would be difficult to say whether it be alive or dead. The slugs thus prepared should not be mounted in spirit, as it is apt to contract and discolour them. A mixture of one and a half parts of water and one part of glycerine has been found to be the best mounting fluid; it preserves the colour beautifully, and its antiseptic qualities are unexceptionable. A good-sized test tube answers better than a bottle for putting them up, as it admits of closer examination of the animal. The only drawback to this process is, that unless the solution is of sufficient strength, and unless the tentacles are extruded when the animal is immersed, it generally, but not invariably, fails. Some slugs appear to be more susceptible to the action of the fluid than others; and it generally answers better with full-grown than with young specimens. But if successful the specimens are as satisfactory as could be desired; and even if unsuccessful, they are a great deal better than those preserved in spirit; for although the tentacles may not be completely extruded, they are more or less so.' "

The *Testacellæ*, or shell-slugs, may be preserved by partially drying them in sand and removing the soft parts through a slit in the length of the foot, filling up with cotton wool, and completing the drying process.

As to the best mode of exhibiting shells in the cabinet, opinions differ. They may be gummed on slips of card or on thin slabs of wood covered with paper; kept loose in card-board trays, or, better, in glass-topped card-board boxes. We much prefer the last-named method for many reasons. Being thus protected from dust they retain their natural appearance better; nearly allied species or specimens of the same species from different localities may be distinguished without risk of their getting mixed, and the bottom of each box serves as a tablet whereon to pencil the collector's notes of localities or habits. If square or oblong boxes are chosen, the larger being multiples of the smaller, they can be arranged with great neatness in the cabinet drawers or covered wood or card-board trays, and any particular box can be taken out for examination of the specimens without disturbing the others. Glass-topped boxes can now be obtained at a moderate price from most of the naturalists' agents in London, or elsewhere. Great care should be exercised to keep a record of specimens from varied localities, and in cases where doubt may hereafter arise, a small number label may be gummed to the shell, or, better, the number may be painted upon it in thin oil-colour with a fine brush, such numbers referring, of course, to a register or diary kept by the collector.

[In any catalogues or papers treating of the Land and Freshwater Shells which may appear in our journal, we propose to follow the Conchological Society's List (2½d. each, or 1s. 6d. per dozen, obtainable from Mr. J. W. Taylor, St. Ann Street, Leeds). This is mainly based on "British Conchology; or an account of the Mollusca which now inhabit the British Isles and the surrounding seas; with particulars of their habits and distribution," by the late J. Gwyn Jeffreys, F.R.S. (1862–9), which is still the standard manual on the subject. It is published by Van Voorst, price, with plates uncoloured, £4. (The Land and Freshwater species are comprised in Vol. I., price 12s., and Vol. V., plates, £1 12s., or coloured, £2 17s.) Other very useful works are: Dr. Gray's edition of Turton's "Manual of the Land and Freshwater Shells of the British Islands" (Longmans & Co., 1857, with coloured plates, 15s., but now to be had cheaper at Wesley's and Wheldon's); Rimmer's "Land and Freshwater Shells of the British Islands" (Allen, 1880, 10s. 6d., plates); Tate's "British Mollusks" (Hardwicke, with coloured illustrations, 6s.); and last, but not least, Mr. Harting's own "Rambles in Search of Shells, Land and Freshwater" (Van Voorst, 1875, coloured plates, 7s. 6d.), in which the species are grouped in accordance with the soils they frequent, and which will be found to be a most useful guide to the beginner in conjunction with the other works mentioned. A very valuable series of papers will be found in the "Journal of Conchology" (Leeds, Taylor Bros.), the editor of which is preparing an exhaustive Monograph of British Land and Freshwater Mollusca, treating fully of their variation, structure, and development.—Ed.]

Discussion.

At the delivery of the above address at the Field Meeting in the forest (*ante* page 167) the following remarks were made:—

Professor Meldola, F.R.S., hoped that the practical effect of the address would be a considerable increase of our knowledge of the distribution and habits of this class of animals in Essex by the efforts of the members themselves, in response to Mr. Harting's appeal. He believed that very little had been done in tracing a connection between the variation of the colour, etc., of shells and their environment and peculiar habits. Judging from the large range of variability which was shown by many species of mollusca, he thought that some interesting results might be thus arrived at. Collectors should note carefully the nature and colour of the soil, the plants and places of rest upon, and in, which the shells were found, so as to determine whether any and what advantages in concealment and protective resemblances were to be traced to the colour variation so frequent, for instance, in the genus *Helix*. Such enquiries had been found to be most fruitful by students of other classes of animals, and there was no reason to suppose that the Mollusca were wanting in those means of escape from enemies which had been detected so commonly in other invertebrata.[5] He might also remind members that we had in Essex a considerable extent of sea-board, and he suggested that the marine and estuarine mollusca of our Essex coast should not be neglected by collectors living in suitable localities.

Mr. Walter Crouch, F.Z.S., said that Mr. Harting was about right in his estimate of the number of species of land and freshwater molluscs in Britain;

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[5] Mr. R. M. Christy called attention to a supposed case of "protective resemblance" in the genus *Clausilia* at a meeting of the Club on December 16th, 1882. "Proceedings E. F. C.," vol. iii., p. 92.—Ed.

there were roughly speaking, 120.[6] He had collected in the Becontree Hundred and the southern portions of the forest, and the results were somewhat as follows: out of the (about) 45 aquatic species in Britain, he had found in the Becontree Hundred, 32; and of the 75 terrestrial species, about 35; making together about 67 species out of the 120. He hoped to add a few species to this list, and he would take an opportunity during the winter session of exhibiting his specimens, and detailing the results of his "rambles in search of shells" in his own neighbourhood.

Mr. W. Cole, referring to Mr. Harting's proposed catalogue of the molluscs of Epping Forest, suggested that the forest district should be taken to include the land set out as forest in the perambulation of Charles I. (1642). This would give a somewhat wider extent of country, which could easily be defined, and he suggested that a plan of the district, showing the limits of the forest, as fixed by the perambulation, should be published by the club, to serve as a guide to the compilers of lists of the fauna and flora of the forest.

Mr. White suggested that members willing to aid in the compilation of a list of the mollusca should work together, so that the whole county could be systematically and carefully explored. Many species might be expected to occur, for instance, near Saffron Walden, which would be wanting elsewhere. He also thought that every effort should be made to get together a good and representative collection in the club's museum, and only the co-operative efforts of a number of members could do this.

Mr. Harting was very pleased to see that some interest would probably be aroused in this subject, and that we might hope to have valuable aid from several of the members of the Club. He called attention to the great paucity of published information on the Essex Mollusca; he could only call to mind one book which even alluded to the subject, and that was "The History and Antiquities of Harwich and Dovercourt," by Silas Taylor and Samuel Dale (about 1732). He hoped that the efforts of the Club would soon supply this deficiency in the natural history of the county.

Stauropus fagi, L., near Brentwood.—On July 18th, I found an almost black form of the female "Lobster-moth" near the ruins of Thorndon Hall. She has laid about thirty eggs.—R. G. WILLIMENT, Brentwood.

Grasshopper Warbler (*Locustella nævia*, Boddaert) near Colchester.—Both Yarrell and Morris state that this bird has been noticed in Norfolk, Suffolk, and several other counties, but neither mention it as occurring in Essex. I have known it to breed more than once at the "Bath Hills," just on the Norfolk side of the river Waveney, opposite Bungay Common; but on Sunday last (August 7th) I watched a pair of these birds for some seconds, within ten yards of me, in a glade of the "High Wood" at Colchester. I was leaning on a gate, and perfectly still, when the male, with tail spread, flew from one side of the covert, alighting in the glade, and, followed by the female, ran, in the "mouse like" manner peculiar to them, into the thick grass and bushes on the other side. I believe that this warbler is not *very* uncommon in the east and south of England, but being remarkably shy, and keeping to the densest parts of heaths and woods, it is rarely observed.—FREDERICK SPALDING, Colchester Museum, August 13th, 1887.

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[6] The last edition of the Conchological Society's "List of British Land and Freshwater Mollusca (1883)" enumerates 46 aquatic species (including one whose claims to rank as British is not thoroughly established) and 86 terrestrial species (including three doubtful species), making in all 132 species; or excluding the doubtful ones, 128. Mr. Laver catalogues (Trans Essex Field Club, vol. ii., p. 88) 75 species as inhabiting the Colchester district.—ED.

F. C. J. Spurrel, F.G.S., C. Thomas, F.G.S., Henry Walker, F.G.S., A. R. Wallace, F.L.S., Rev. W. Linton Wilson, M.A.

All subscriptions (marked "Denehole Exploration Fund") should be sent to Thomas Royle, Esq., *Treasurer*, "Dalton House," Upton Lane, Forest Gate, E. A list of additional subscriptions will be published in the ESSEX NATURALIST, and a full list of subscribers will be given in the Report of the Explorations.

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Attention is called to the statement as to the renewal of the Denehole Explorations on pages 2 and 3 of wrapper.

ANNOUNCEMENT RESPECTING THE COMMITTEE OF CORRESPONDING MEMBERS.

In consequence of the alteration in the method of issuing the publications of the Club, whereby it is now possible for all brief communications from members in various parts of the country to appear without delay in the monthly parts of THE ESSEX NATURALIST, the council finds that it is rendered unnecessary to continue the committee of special "Corresponding Members," which was appointed by the council, at my proposition, in the spring of last year, and to which I was elected secretary. I have therefore been sanctioned to request those gentlemen who kindly undertook to serve as the local correspondents of their several districts, to transmit in the future all matters of importance to the Club direct to our Editor and Honorary Secretary, Mr. William Cole, instead of to myself.

In making this intimation, perhaps I may take the opportunity of urgently appealing to *every individual member* throughout the county to heartily co-operate in thus forwarding the aims and work of the Club, as it is of vital importance to secure that no local occurrences of scientific interest, that may in the future come within their knowledge, escape prompt attention, but that they may receive a fitting record in our annals.

WILLIAM WHITE.

THE EAST ANGLIAN;

Or, NOTES AND QUERIES on subjects connected with the Counties of

SUFFOLK, CAMBRIDGE, ESSEX & NORFOLK,

Edited by the Rev. C. H. EVELYN WHITE, F.S.A, F.R.Hist.S., Vicar of Christ Church, Chesham; Hon. Mem. (late Hon. Sec) of the Suffolk Institute of Archæology and Natural History, etc.

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BEING THE

JOURNAL ["TRANSACTIONS" AND "PROCEEDINGS"]

OF THE

ESSEX FIELD CLUB.

EDITED BY

WILLIAM COLE,

Honorary Secretary.

SEE NOTICES OF FIELD MEETING ON LAST PAGE OF WRAPPER.

Contents:

PAGE
Two New Essex Gall-makers—By Edward A Fitch, F.L.S. *(with illustration)* 177
What is the Use of the Essex Field Club ?—By W. Whitaker, B.A., F.R.S., F.G.S. 180
Note.—Salting Mounds—J. C. Shenstone 181
A Plea for the Essex Ravens—By J. H. Gurney (Jun.), F.Z.S. 182
Note.—Badgers Near Epping—By James English 183
Preliminary List of the Microscopic Fungi of Essex—Ustilaginei and Æcidiomycetes—By M. C. Cooke, M.A., LL.D., A.L.S. 184
Notes.—Boulder at Brentwood—E. A. Fitch; Badgers formerly at Maldon—E. A. Fitch; Badger near Ilford—Robert Lodge; Affection of a Rabbit for Her Young—B. Morris; A Stoat's Larder—E. Catchpool; Descent of a Denehole at Bexley, Kent—T. V. Holmes; The Ancient Deneholes at Tilbury, Essex *(with illustration)*; *Sphinx convolvuli* at Maldon—E. A. Fitch; The Herd of Red-deer from a Single Hind in Hatfield Broad Oak Forest, Essex; Great Snipe *(Gallinago major)* near Colchester—H. Laver, F.L.S.; Well-section at Kelvedon, Essex—G. F. Beaumont .. .. 186—189
The Uses of Fungi—By H. T. Wharton, M.A., M.R.C.S., F.Z.S. (*commencement*) .. 190

The authors only are responsible for the statements and opinions contained in their respective Papers.

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THE EAST ANGLIAN;

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It has been proved that ordinary vinous fermentation always involves the formation of yeast: the more yeast, the quicker the fermentation. How by their growth these living organisms become the sources for the ferments proper, which are considered by scientists to be really only chemical substances pure and simple, has not yet been ascertained. All we know is that, in the presence of certain substances, yeast appears; and that with its multiplication—by simple "gemmation," or budding, be it noticed, and not by sporification, which is never observed—fermentation takes place. Whence the yeast comes it is beyond our power to say, save that germs capable of its reproduction must be carried by the air. According to Pasteur's experiments and observations, the yeast which forms spontaneously in grape-juice is derived chiefly from certain germs which abound about harvest-time on the grapes, and still more on the grape-stalks. These germs are largely diffused also through the atmosphere of breweries, wine-cellars, and laboratories where fermentation experiments are carried on; but they are not by any means widely diffused through the atmosphere generally.

It is not, however, only as the means by which mankind obtains wine and beer and whiskey that yeast is such an important economical factor. It is to the properties of yeast that we owe almost all the bread which we ordinarily eat. The generation of carbonic acid gas caused by yeast has indeed been imitated by art, and dough can be impregnated with the gas by purely mechanical means, as in the so-called "aërated bread," or by the interaction of certain chemicals in the form of "baking-powders." But by far the larger proportion of the bread consumed in England is spongified and made light and digestible by the action either of brewers' yeast, or of the "German yeast" obtained from the fermentation of wine.

Before I have done with yeast, I must call your attention to the fact that it has a place in the British Pharmacopœia, where directions are given for making a "yeast poultice," *cataplasma fermenti*, as it is there called. In Dr. Garrod's classical work on Materia Medica the therapeutical uses of yeast are thus summarized: "Yeast, when externally applied, acts as a stimulant and antiseptic, and in the form of cataplasm or poultice is employed to correct the discharges of indolent ulcers. Internally it has been used in low states of the system, in which it is stated to clean the tongue and correct the fœtor of the alvine discharges, to prevent the formation of boils and carbuncles, and as a remedy

NOTES UPON SOME MOUNDS NEAR THE ESTUARY OF THE THAMES.

By J. G. GOODCHILD, F.G.S., F.Z.S., H.M.'s Geological Survey.

[*Read February 27th*, 1886.]

THE curious mounds that occur here and there in the fluvio-marine alluvial tracts of Essex have been explored time after time by several competent observers without, so far, ever having yielded evidence that would enable one to arrive at any satisfactory conclusion regarding their precise nature and origin. Mounds externally similar and occurring under much the same conditions have long ago been known to exist elsewhere. The nature and origin of these has also been again and again discussed with much the same kind of result as was arrived at in the case of the estuarine mounds of Essex. With a view to throwing at least a little additional light upon some of the questions still undecided, I undertook, at the suggestion of the President of the the Essex Field Club, a re-examination of some of these mounds occurring on the south side of the Estuary of the Thames, where their external form had often attracted my attention at intervals since the year 1860. The area where these mounds occur in greatest number appears to be the low marsh land of Sheppey bordering upon the Swale and the Medway. The marsh land referred to is a broad expanse of alluvium occupying the low ground between the foot of the slope extending Thames-ward from the North Downs, and the mass of London Clay forming the uplands of Sheppey. The marsh alluvium of Sheppey appears everywhere to be spread over a very uneven floor, which seems to consist entirely of London Clay. The irregularity of this floor is clearly shown by the fact that here and there, all over the marsh, detached bosses and small hills of London Clay rise above the dead level of the surrounding marsh, and are separated from each other, and from the main mass of Sheppey, by intervening flats of alluvial clay of variable extent. The origin of these particular mounds hardly admits of any reasonable doubt: they are simply what Mr. F. C. J. Spurrell[1] has aptly termed "leavings" of London Clay, and are clearly due to the irregular denudation of the thickness of London Clay that formerly spread continuously over this and the area adjoining.

Associated with these, however, are some other mounds, generally smaller in size, whose nature does not so readily admit of explanation. Professor Hughes, who examined these mounds in connection with the Geological Survey of that part of Kent, came to the conclusion that, like the larger mounds above referred to, they represent projecting bosses of London Clay, due to the very irregular denudation effected by the salting streams cutting down through alluvium older (and higher lying) than the alluvium of the present marsh. He discusses their origin in the Geological Survey Memoir on the "Geology of the London Basin," page 291 (published in 1869). Soon after the appearance of the Memoir referred to, Mr. H. Stopes[1] gave an account of his investigation of some similar mounds on the Essex side. He carefully guarded himself against any definite conclusion regarding their origin; but the view that the Essex mounds he describes are artificial seems to me to be clearly implied by his remarks. Later, the Rev. J. C. Atkinson, of Danby-in-Cleveland, examined these same Essex mounds, and came to the conclusion that they represent vestiges of old salt works, like some similar mounds met with under much the same physical conditions in Yorkshire. Various other views have been from time to time advanced by divers observers regarding the nature of these problematical mounds, the majority being in favour of the view that they are not due to the action of natural causes, but are wholly, or mainly, artificial in character. The mounds in Sheppey specially under notice have, therefore, been variously referred to look-out stations *(speculatoria)*; to the sites of the pottery works of some primitive people; to the homesteads of seafaring man in early times, to standing-places for the protection of cattle when the marsh was flooded; and, lastly, to the "tips" where the mud has been put when the numerous ditches that intersect the marsh have been dug out. There is much to be said in favour of each and every one of these views, especially when the area examined does not extend beyond one locality. And there is almost as much to be said against any one of these views when a wider survey of the question is taken.

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[1] "Early Sites and Embankments on the Margins of the Thames Estuary," "Archæological Journal," vol. xlii., p. 269.

Mounds similar to those at Sheppey occur at the mouth of the Humber (Clement Reid); near the mouth of the Tees (Geo. Barrow and T. V. Holmes); near Redcar (Rev. J. C. Atkinson); and on the west coast of England, near the estuary of the Mersey. Doubtless, were the question looked into, similar mounds would be discovered in connection with the fluvio-marine alluvia of other parts of the kingdom.

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[1] Archæological Journal," xxxvi. pp. 369-72, and ESSEX NATURALIST, i., pp. 96-105.

The mounds at Sheppey are somewhat difficult of access; partly for that reason, partly because they have been described in some detail by others, I have devoted my examination chiefly to the mounds of another area, where the main facts can be examined easily, even in the course of a journey by train. That area lies right and left of the London Chatham and Dover Railway, between Faversham Station and Whitstable, where a fine and very characteristic exposure of these mounds can be easily examined by travellers to and from Whitstable, Herne Bay, and Margate. Two well-marked groups of mounds occur here. The northernmost lies to the north-east of Graveney Hill, in the alluvial tract between that hill and Whitstable Flats. The other occurs in the same alluvial flat, right and left of the railway between the third and fourth mile-posts from Faversham. As this latter group is both the better developed and the more easily examined, I have thought it better to take it as a type.

In regard to the geological structure of the district, the Geological Survey Map (Sheet 3) shews a tract of alluvium, about two square miles in area, shut in on the land side by low hills, which consist of the lower part of the London Clay, together with part of the Lower Eocene strata beneath it. These strata are inclined at a low angle, nowhere more than three or four degrees, towards the north-east, and their dip is continued to the south for several miles, so that the base of the impermeable London Clay and the porous sands and pebble beds at its base rise, from the sea level at Sea Salter, to elevations of 300 feet above that level about Dunkirk and the other hills to the south of the locality under notice. The mounds at Sheppey are situated in like manner in relation to the Eocene strata there. Around Sea Salter the general form of the ground occupied by the Tertiary strata does not call for any special remark, except that there are certainly no traces of any marked and abrupt inequalities of the surface anywhere discernable there. Their slopes incline gently downwards, and finally disappear beneath the dead level of the marshy alluvium in the usual manner. Here and there, projecting through the alluvium, here, much as at Sheppey, are large mounds that no one can reasonably regard as anything else than bosses of London Clay, which the irregular denudation of the surface has accidentally left at higher levels than the average level of the marsh floor around. Associated with these mounds of natural origin are others of smaller size, different mode of occurrence, and altogether characterised by features of a distinct type. It is in regard to the nature and origin of these last-mentioned mounds that so much discussion has arisen. The following description may serve to make their form intelligible.

Going along the line from Faversham in the direction of Whitstable, the first of the mounds alluded to stands on the north side of the railway, close to the eastern flank of one of the bosses of London Clay above mentioned. The smaller mound is rudely circular in plan, is about twenty feet in diameter, and rises in the form of a flattened dome to a height of five or six feet above the general level of the marsh around. There is no trench near, unless some of the ditches be regarded as such. The nature of the soil composing the mound is shewn in several places by small sections on the slopes. These shew fine-textured, loamy clay, dark grey when dry; in this, as in every other respect, exactly like the the mud of the marsh adjoining. There were no signs whatever of any burnt clay, nor of any pottery, nor of any other indications of human occupation.

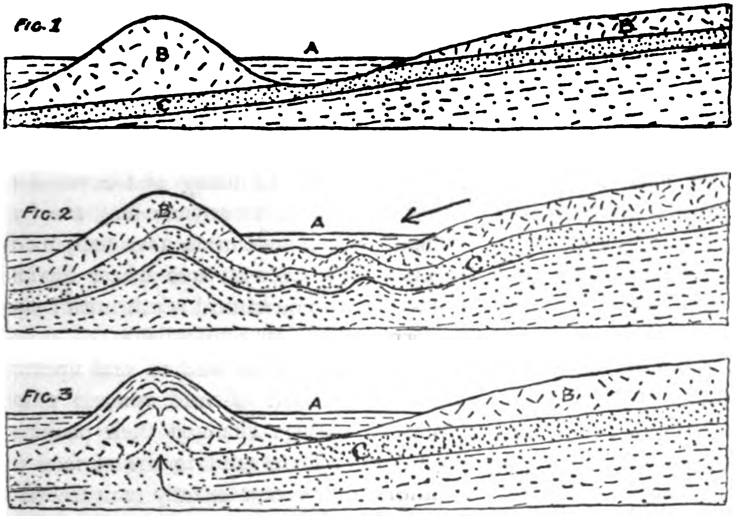
A short distance nearer Sea Salter are two or three others situated on the same side of the railway. One of these is kidney-shaped in plan, is about sixty feet in its largest diameter, and rises to a height of about seven feet above the level of the marsh. None of these differ in other respects from the mound first described.

A few hundred yards from these last, and chiefly on the south-eastern side of the railway, occurs the most remarkable group of all. The other mounds were isolated, and seemed to have no connection with each other. But the group now under notice consists of a close-set assemblage of mounds, each with its base touching or running into the base of the mound adjoining, so as to form a nearly continuous chain of mounds. In plan they are disposed in the shape of a **V**, with its open side directed towards the eastern end of Sheppey. They rise, like the others, abruptly from the dead level of the marsh, and are all nearly of the same elevation, so that they look at a little distance like one long, low, flat-topped hill. On a closer inspection their remarkable hummocky form immediately recalls that of eskers. There is the same irregularly-linear arrangement of strange-looking, steep-sided mounds, the same queer and unaccountable dimpling of the surface, and the same likeness to human handiwork that forms so characteristic a feature of the eskers. I paced along one limb of the **V**-shaped group, and found that it extended rather more than a hundred and sixty yards. The average height is about fifteen feet above the marsh. The other limb, that to the east of the one described, is more broken up, and not quite so easy to measure, but it is certainly quite as long as the last. All the mounds of the limbs consist, so far as I could discover, exclusively of the same dark grey loamy clay as the marsh. None of them shewed any trace of levelling on the top; there is no evidence of the action of fire, no burnt clay, no slag, no charcoal, no pottery. They consist simply of an assemblage of steep-sided mounds of dark grey clay, rising abruptly, at irregular horizontal intervals, out of the flat surface of the marsh. Sections to any depth are not common, though small surface exposures are found without difficulty. But one limb of the group extends across the line where the railway runs; and one of the mounds is cut through, and a small section is laid bare, in consequence. A careful examination of this confirmed the view that the mounds under notice consist simply of clay in no way distinguishable from the clay of the marsh land around.

On the north-east side of the group last mentioned occur a few smaller mounds that differ in no essential respect but that of size from any of the others. These decline in elevation as they are followed away from the main mass, so that in the direction indicated the mounds die away into the marsh, which, beyond the point where this occurs, maintains a uniform level as far as Sea Salter.

The mounds in Sheppey agree in all their general character with those here described in detail. In both cases there is the same curious combination of bosses of London Clay manifestly of natural origin, with other mounds whose origin is more problematical. In Sheppey, and probably in other localities where these mounds occur, some, at least, of both kinds of mounds have been modified to suit local requirements. In many cases this has clearly been done with the object of taking advantage of the elevated position of these mounds to adapt them as shelter for cattle during floods. Elsewhere it is quite certain that some of them have been used for homesteads. Indeed, I have myself stayed several days at a house in Sheppey built upon one of the smaller of these mounds. Elsewhere some of these may have been used for other purposes besides those here named. Some, perhaps, because the kind of clay they consist of was found to be suitable for the manufacture of a rude kind of pottery, and the mounds, being above the level of the marsh, formed more convenient sites for pottery works than the surface formed by the same kind of clay at lower levels. The variable size of these mounds and their sporadic distribution is, I think, against the view that they represent the steadings of temporary "lake dwellings" used by early seafaring folk. The degree of salinity of the water in the neighbourhood, again, tells against their having been used as salt works; and the absence of any signs of the action of fire in the mounds at Sea Salter would seem to indicate that some, at least, have not been used by man, but are of natural origin.

The question as to what that origin has been, is not so easily answered. One possible explanation I would suggest is that a few of the mounds may be due to the pleating of masses of half-consolidated alluvial mud consequent upon the sapping and consequent slipping of masses of that formation so troublesome to engineers, the London Clay. I have seen ridges of much the same character thrown up before a slipped mass of London Clay on a railway. Ridges of much the same kind were thrown up along the Settle and Carlisle Railway in 1872, when a heavy embankment was thrown across a peat moss where Hawes Junction now is. The pliant mud and peat were squeezed up on each side of the embankment and thrown into a series of parallel



DIAGRAMS TO ILLUSTRATE THREE POSSIBLE MODES OF FORMATION OF THE MOUNDS AT SEA SALTER.

FIG. 1. The alluvium (A) deposited around an old outlier of London Clay (B).

FIG. 2. Mound of upheaval, formed by the slipping of the Tertiary strata (B and C) in the direction of the dip, as shewn by the arrow.

FIG. 3. Cone of deposition of alluvial mud, piled up around the orifice of an old spring. In this case the spring is supposed to burst forth along the line where the plane of saturation of the Tertiary sands was intersected by the floor of the old estuary.

folds, some of them even inverted. As these crumble down under the action of the weather they develop into small mounds having much the same form as those at Sheppey. The conditions requisite for the formation of ridges in this way must have been present again and again in both the Sheppey area and that at Sea Salter.

I would suggest a second possible explanation. All along the foot of the slope extending Thameswards from the North Downs, the strata are as a rule more or less saturated with water percolating downwards along the planes of bedding, in many cases representing the underground drainage derived from the whole outcrop. Near the foot of the slope, the upper limit of underground saturation cuts the surface at or near the sea level, and springs are thrown out as a consequence. Hundreds of such springs occur along the zone referred to, all the way along the foot of the northward slope bordering on the Thames, and the Swale, between Chatham and Whitstable, and it is from these sources that so many of the smaller seaward-flowing streams take their origin, as anyone may see by examining a good geological map. Now it must often have happened that some of these springs burst forth over an area where fluvio-marine alluvium was being laid down. The natural result must have been a conflict between the effort of the spring to relieve the pressure of water behind it, and that of the alluvial mud to seal up the orifice. Under these circumstances, a kind of mud volcano must have resulted again and again as the springs changed their position and worked their way up through the alluvial mud to the surface at different places. Many of the mounds present exactly such features as would result from the deposition of cones of marsh mud brought up by springs at the time when the marsh land was flooded by alluvial matter.

There is yet another, and, as I think, a better explanation still—better because it will apply to all the instances that have yet come under my own notice. That is, that these mounds are simply "mud lumps" which have originated in the same manner as those described by Messrs. Humphreys and Abbot in their Report on the Mississippi.[1] Sir Charles Lyell ("Principles," vol., i., ch. xix., pp. 443-450, gives an abstract of these observations. He notes that the mud lumps referred to are always situated off the mouth of the rivers, that they all consist of homogeneous tenacious mud. "This mud is chiefly pushed up bodily, but some of it consists of matter brought up by a spring to the top of a dome-shaped mass, and thrown down on the surface on all sides over which the muddy water pours. So much carburetted hydrogen . . . . is emitted, together with salt or brackish water, that Col. Sidell suggests that they deserve the name of gas vents rather than of springs." (Lyell, *op. cit.*, p. 441.) Sir Charles goes on to say (p. 449), referring to the alluvial matter deposited by the Mississippi, that it "forms annually a mass of no less than one mile square, having a thickness of twenty-seven feet. It consists of mud, coarse sand, and gravel, which the river lets fall somewhat abruptly when it comes into contact with the still salt water of the Gulf. A cubic mass of such enormous volume and weight thrown down on a foundation of yielding mud . . . . may well be conceived to exert a downward pressure capable of displacing, squeezing, and forcing up some parts of the adjoining bottom of the Gulf, soon to give rise to new shoals and islands."

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[1] My attention was first called to this point by my colleague, Mr. Topley.

The marked parallel between the cases cited and those here specially under notice will, I think, strike everyone who looks into the matter. Both in America and in all the occurrences yet made known in England, these problematical mounds occur just at the point where a river bringing down fresh water charged with sediment and with much organic matter is met by the salt water of the ocean. A rapid throwing down of mud takes place, concurrently with the destruction and entombment of organic matter, and with the consequent evolution of gases resulting from its decomposition. Gas vents and springs of water break through the alluvial mud as fast as this is formed, and cone after cone of mud is piled up here and there as the vents change their position. Subsequently, the deposition of alluvial matter ceases, and then, with the change of conditions, the piling up of the cones ceases also. After a time the area is submerged only during floods, and the alluvium thrown down dries in quite horizontal sheets abutting against the slopes of the mounds.

In the case of many of the English mounds, it seems more than likely that early man took advantage of them for his own purposes, sometimes converting them into grave mounds, as he shaped tumuli out of the eskers of Northern England; or he may have turned them into homesteads, or have used up their clay on the spot for his rude kinds of pottery, or have turned them to any other use suggested by his special need at the time.

What I suggest is, that the Kentish mounds are mainly natural in origin, that they may be due to a variety of causes (chiefly, I think, to the same causes that have produced the mud lumps of the Mississippi), and that they have in many cases been since more or less modified by the agency of man. It seems highly probable that this view of the origins of the mounds observed in the fluvio-marine area of Kent may apply also, though with some limitation, to the similar mounds occurring in Essex and elsewhere. It would follow accordingly that the precise nature of each group of individual mounds will have to be determined entirely by the evidence it may furnish by itself, without regard to what has been proved in connection with other mounds even in the area adjacent. And as these mounds offer no good natural section, and may be mainly, or wholly, either natural or artificial, it is only by means of deep and carefully-cut trenches that their true nature can be thoroughly ascertained.

Ino statices, Leach, at Chingford, Essex.—I was glad to find this year that the pretty little moth, *Ino statices*, was plentiful in one of my fields, and I was able to obtain a fresh series in the finest condition. I had never before met with it so near London.—SIDNEY COOPER, "Hawkwood," Chingford, November 12th, 1887.

Conger (*Conger vulgaris*) **at Maldon.**—On October 26th, when James and Henry Dedman were at Beeleigh, they found a fine conger eel in the Chelmer, on the mud, against the old milltail, the extreme tidal limit of the estuary. The fish, which was alive when found, in fact rather too lively, was sold to Mr. O. A. French, fishmonger here, and distributed in the usual manner to the satisfaction of all customers, as the fish, which was a male (soft-roed), was in splendid condition; it was five feet in length, and weighed a little over thirty-five pounds.—EDWARD A. FITCH, Maldon.

Abundance of Sphinx convolvuli, L., at Chingford, Essex.—I have this season captured fifty specimens of this beautiful insect in my garden here, the greater number while flying over the flowers of *Nicotiana affinis*, which had been planted in abundance to attract the moths, and some over petunias and pink geraniums. The moth first made its appearance on the 16th of August, and it continued to occur for about a month. Most of the specimens taken were captured at dusk, which seems to be the most favourable time, but some were caught by the aid of a lantern when it was quite dark. One damaged specimen, which I freed, I caught a second time the same evening; and it has been my experience that if a moth escapes the first efforts to catch it—an event which very seldom happens—the insect almost invariably returns to the same spot at a later hour. Very few of the specimens were worn; some, as might be expected, were more or less injured in the net, but others were in very fine condition, indeed, equal to bred moths. I may add that last year (1886), at my old residence in Walthamstow, I captured nine specimens of *Sphinx convolvuli*; the year before (1885), seven specimens; and in 1875, seven specimens, but none during the intervening period; so that after an interval of ten years, during which I failed to meet with a single specimen, I have taken the "Convolvulus Hawk-moth" for three consecutive years. It was especially abundant this year, and it was no uncommon occurrence for a pair to be flying over the flowers at a time.—SIDNEY COOPER, "Hawkwood," Chingford, Essex, November 12th, 1887.—[*Sphinx convolvuli* appears to have been unusually plentiful in many of the English counties during the past season; the entomological journals contain numerous records. In France also it has been common.—ED.]

THE ESSEX FIELD CLUB.

THE EIGHTH ANNUAL CRYPTOGAMIC AND BOTANICAL MEETING, AND ORDINARY MEETING,

Friday and Saturday, October 28th and 29th, 1887.

IN marked contrast to the miserable weather we had suffered under on some former occasions, our two fungus-hunting days this year were, meteorologically, all that could be desired—the bright sunshine and mild spring-like air put every member of the party in good spirits as we started on Friday morning from Chingford Station, bent on a good day's collecting in the woods. The Secretaries had engaged a large "break" to carry the party, so as to avoid long and exhausting walks from one part of the forest to another. The direction of the collecting, and the scientific determination of the specimens, were again undertaken by the two eminent mycologists, Dr. M. C. Cooke and Mr. George Massee, F.R.M.S., who have so often given their valuable aid on like occasions, and under their supervision portions of the woodlands from Chingford to the north of Epping were explored. The absence of one well-known face was sincerely lamented by all—Mr. James English, of Epping, who had attended every previous "Fungus Foray" since the establishment of the Club, and whose intimate knowledge of the best localities and the mycological productions of the forest was always so abundantly evident from the contents of his collecting baskets, was suffering under severe illness, which had confined him to his room for months, and was, of course, unable to join in the excursion. The party was driven by his cottage in Lindsell Street, Epping, in order that the members might wave a "good-day" and best wishes to our staunch coadjutor in past autumnal huntings. Canon Du Port and Mr. Worthington Smith, with other good men and true, were also unable to be present, to our loss and regret.

Although the days chosen purposely for the meeting this year were a month later than ordinarily, the long drought of the summer, and the recent keen night frosts, had much diminished the numbers and manifestly checked the growth of even the most familiar woodland toadstools. Dr. Cooke reported that so detrimental had the continued dry weather been to the plants, that the results of a visit to the forest by himself and Mr. Massee on October 1st (about the usual date of our "Fungus Forays") had fully justified the wisdom of this year's postponement, for not more than seven or eight common species of fungi had been found on that occasion. On October 15th, the date selected by our good friends the Hackney Microscopical Society for their annual field-day, the weather, fungologically speaking, had somewhat improved, and although there was still a very great dearth of individuals compared with favourable years, it was found possible to complete a list of upwards of one hundred species seen during the excursion. Of these about half-a-dozen were additions to the mycological flora of Essex, namely:—*Agaricus* (*Stropharia*) *merdarius*, Fr.; *Agaricus* (*Collybia*) *ocellatus*, Fr.; *Agaricus* (*Mycena*) *roridus*, Fr.; *Agaricus* (*Hypholoma*) *epixanthus*, Fr.; *Agaricus* (*Pleurotus*) *limpidus*, Fr.; *Polyporus* (*Fomes*) *fraxineus*, Fr.; and the variety *mulleri* of *Agaricus* (*Pholiota*) *squarrosus*, Fr., as determined by Dr. Cooke and Mr. Massee, who were also present at that meeting. At our own "foray," the exertions of our collectors were but ill-requited; it was with great difficulty that even small vasculums and baskets could be filled, and many of the specimens gathered (in default of better) were either dwarfed by deficiency of moisture, or had been discoloured by the midnight frosts. We found that the woods to the north of Epping were the most productive, and particularly a somewhat damp bit of forest on the left-hand of the road leading to Weald Gullet. We were twice cheered by the sight of some of the forest deer; once near the "Wake Arms," and again in Honey Lane Quarters, the latter apparition comprising two fine bucks. At High Beach a party of keepers and onlookers were discovered much exercised as to the best method of regaining some lost ferrets; the eager little animals had been sent into the rabbit burrows in the old warren on the brow of the high ground near the "King's Oak," and, probably finding a well-furnished larder below, had refused to re-appear at the call of their owner, charmed he never so wisely! No flowering plants worthy of note were gathered, but the woods in the soft sunlight were gayer than any garden, glowing with the rich red, russet, and golden tints of the fading foliage of the beeches, hawthorns and brackens. On taking the hampers containing the day's gatherings to the head-quarters for the meeting, the "Roebuck Inn," on Buckhurst Hill, we found good contributions of specimens awaiting us from Mr. Wire, who had searched the forest about Wanstead and Woodford; from Mr. C. Oldham, who had hunted more particularly at High Beach and Monk's Wood, and from Mr. C. Hundley, whose basket had mainly been filled at Loughton.

On the Saturday, the various parties of visitors were driven to High Beach, collecting there, and in Monk's Wood, Loughton Camp, etc. As the gatherings were brought up to the Inn, they were closely examined by Dr. Cooke and Mr. Massee, and from the combined contributions of members, too numerous for individual notice, a very fair series of named specimens was gradually amassed and arranged upon the tables devoted to the fungi. A minute criticism of the specimens enabled Dr. Cooke to report that the additions made to the Essex list during the two days' hunting, although but few (seven in number), were not without interest. Amongst them was *Cortinarius brunneus*, Fr., of which the typical form has, perhaps, not been found in Britain, and if so, had certainly not been recorded since the time of Withering. The other additions to the local flora were: *Agaricus* (*Clitocybe*) *catinus*, Fr., ; *Cortinarius hemitrichus*, Fr. ; *Cortinarius dolabratus*, Fr. ; *Cortinarius torvus*, Fr. ; *Hygrophorus russo-coriaceus*, B. & B. ; and *Sphærobolus stellatus*, Fr. Thus making, with those above recorded as having been found on October 15th, the substantial contribution of thirteen species and one variety to the Epping Forest list—certainly by no means an unsatisfactory result in view of the paucity of fungi prevailing not only in England, but in France also, during the exceptionally arid and unfavourable season of 1887.[1]

In addition to the gatherings of fresh fungi, four ranges of tables in the great room at the "Roebuck" were very completely filled with interesting collections of dried plants, and other specimens, kindly brought up to the meeting by members and friends. Mr. F. J. Hanbury, F.L.S., exhibited a series of the British Hieracia, or "Hawkweeds," forming part of his magnificent collection of species of this difficult group, together with a selection of drawings, made by Miss G. Lister and Mrs. F. J. Hanbury, for his proposed new monograph of the genus. He also showed specimens of eleven plants found during the last two or three years which were new to Great Britain. Mr. C. A. Wright, F.L.S., exhibited an almost complete collection of the plants of Devon and Cornwall, gathered by himself during the present summer. Also fresh specimens of *Allium ampeloprasum*, L. var. *babingtonii*, Borrer, collected in the only station in which it is known to grow wild in England, and a *Sparganium* from the Lizard, Cornwall, collected in September, 1887, the determination of the species of which presented some points of difficulty. Messrs. H. and J. Groves brought up an exceedingly beautiful collection of the characteristic plants of the Scottish Hills, gathered by themselves with great care, and containing many rare species in the finest condition and in all stages of flowering and fruiting. Mr. J. T. Powell had a selection from his herbarium of Essex Brambles, including the forest species, of which he is now making a special study, and also a series of plants from various parts of Essex, notable from their rarity or local occurrence. Prof. Boulger exhibited a collection of Melanospermous and Rhodo spermous Algæ; specimens of *Geaster;* and an interesting collection of little known books, including reprints of early botanical works, the Wiltshire weather and phenological records, and the U.S.A. Agricultural Report, 1885, containing lists and plate of edible fungi. Mrs. Holland, of Colchester, showed some very pretty and original designs for *menu* cards, programmes, etc., in which the decorative value of the commonest species of ferns were fully demonstrated; the designs were worked out with the dried fronds most charmingly supplemented by sketches and "touches" in sepia and water-colour. Mr. Walter Crouch's contribution consisted of a large and varied collection of botanical curiosities, including the seed capsules of *Cactus melocactus*, called "Turks-caps," from the Nassau Bahamas; *Briza maxima*, from Hog Island, Nassau Bahamas; *Anastatica hierochuntis*, L., the "Rose of Jericho" (called in Palestine "Kaf Maryam"= "Mary's hand '), plants which have the faculty of apparently reviving when placed in water, after having been long dried; and portions of seed-capsules, seeds, and the silky down of *Bombax ceiba*, the Silk-Cotton-Tree, from a specimen planted in Nassau 200 years ago by John Miller. The roots grow out like great buttresses, radiating from the trunk for some 15 yards, and rising some six or eight feet, so providing pleasant shady nooks of shelter from the sun's heat. Dr. M. C. Cooke exhibited and presented to the Club's library a series of coloured plates from his fine work, "Illustrations of British Fungi," comprising all the Essex species yet figured. Mr. F. W. Elliott exhibited nests of a solitary wasp, *Eumenes coarctata*, from Bournemouth. Several microscopes were provided by the kindness of Messrs. Wire, Sauzé, and Paulson, under which local botanical and other preparations were exhibited.

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[1] Our last published list of the Epping Forest fungi was that compiled by Dr. Cooke and Mr. English in 1882 (Trans. Essex Field Club, vol. ii. (1882), pp. 181–91). Many additions have since been made to this, but the notes are still in manuscript. We think that the time is about come for the publication of an extended and revised catalogue, and we hope, by the kindness of Dr. Cooke, to be enabled to print such a list in the ESSEX NATURALIST before the arrival of next year's fungus season.—ED.

During the evening an ORDINARY MEETING (81st) was held for the proposal of new members, Mr. T. V. Holmes, President, in the chair.

After some formal business, the Chairman called upon Dr. Cooke, who gave his usual racy and interesting address on the botanical results of the two days' gathering; on mycological meetings in general, and on the conduct and management in the past, and suggestions for the future, of the Essex Field Club's annual foray in particular. In the course of his speech the Doctor alluded to the regretable absence of some well-known botanists, probably owing to the late date fixed for the meeting. Referring to the dearth of fungi, he said that such had been the general experience in all parts of England he had visited—and even in France, Messrs. Plowright and Phillips, on a late visit to Paris, found that so far as the mycological harvest went, they might just as well have staid at home—fungi were as scarce this year on the Continent as in England, and Epping Forest was only one of many generally productive localities which had failed to furnish forth the usual harvest of specimens. Dr. Cooke referred to the results of the two days' explorations, and to those of the meeting of the Hackney Society, given above, and then went on to say that one result of these annual forays was that the general press had begun to take notice of their proceedings. In the "Standard" for Sept. 19th a leading article dealt with the gastronomic aspect of fungus hunting, the writer dwelling upon the comparative ease with which the poisonous and edible species could be discriminated:—"In England we use so few kinds that it is remarkable how anyone living in the country, or indeed anywhere else, fails to master the trifling knowledge which would enable even a child to distinguish the good from the indifferent or the actually dangerous species. On the Continent many others are sold and eaten by all classes, which in these islands are known only to the experts who try experiments with their digestions at the annual dinner of the Woolhope Club, or its rivals organized by the fungus foragers of the Scottish Cryptogamic Society, or the Essex Naturalists, whose autumn hunt in Epping Forest is due next month." The members had been told a good deal in years past of the pleasures and dangers of fungus eating, but no attempt had yet been made at their annual gatherings to reduce theory to practice; the remarks in the "Standard" might well be read as a hint that the Essex Field Club's foray should develop from a simple mycological to a practical mycophalogical meeting. An effort should be made to provide in future years a dish or two of edible fungi, so that the members could test practically their merits as food. If fungi were plentiful next season, he would propose that the experiment should be tried, and he would undertake to examine the raw material and see that no species in any way dangerous were included in the feast. The Doctor was not prepared to endorse his friend Mr. Bicknell's assertion that there were no such things as poisonous fungi; but there were certainly not more than 20 or 25 species which could be so designated, and the fungus-eater had a choice of at least 80 British species which were perfectly wholesome. That, he thought, was enough, without venturing to repeat Mr. Bicknell's gastronomical experiments with such species as *Lactarius piperatus*, *Boletus luridus* or *Agaracus muscarius*. Persons in their first essays as mycophagists should bear in mind that each fungus had a distinct odour and flavour, and were not all like the common mushroom; even mushrooms varied much in these particulars, and there was often great difference in flavour between the wild and cultivated samples.

During his address Dr. Cooke also alluded to the preliminary list of the microscopic fungi of Essex which had recently appeared in the ESSEX NATURALIST (vol i., 184). In preparing it he had made full use of the Kew Herbarium of that of the late Rev. M. J. Berkeley, and of his own herbarium. He was fully aware that the list was a very small one, and, moreover, very imperfect, but it included all the reliable records of the two groups Ustilaginei and Æcidiomycetes in his possession at the date of publication. This could with truth be said of it, that the list was correct as far as it went. Additions could easily be made as further species were found; and he hoped that botanists in Essex would do all in their power to show the imperfections of his tentative list by largely increasing the stock of authentic material upon which such a catalogue could be based, and so enabling a judgment to be formed as to the mycological riches of the county. Lists of the other groups would be prepared and published as soon as possible.

The President in proposing a very hearty vote of thanks to Dr. Cooke and Mr. Massee for their valuable aid during the two days' meeting, and also to the various exhibitors that evening, said that he felt sure all present would learn with deep regret that the absence of their constant fellow-helper in former years, Mr. James English, was caused by very serious illness.

The votes of thanks were passed by acclamation, and the remainder of the evening was devoted to the examination of the numerous specimens upon the tables.

ORDINARY MEETING, Saturday, November 12th, 1887.

THE Eighty-second Ordinary Meeting was held at the Public Hall, Loughton, at seven o'clock, Mr. T. V. Holmes, President, in the chair during the earlier part of the evening, and afterwards Prof. Meldola.

The Hon. Librarian read out a long list of books, "Transactions," Journals and pamphlets, received by donation, purchase, or exchange, and a vote of thanks was returned to the several donors.

The Secretary exhibited on behalf of Mr. W. Greatheed, several photographs taken of the Deneholes during the recent explorations. Also photographs by the same gentleman of the blocks of sandstone on Orsett Heath, and at Corringham, Essex. Particulars of these blocks will be given in the ESSEX NATURALIST.

Mr. C. Oldham exhibited a box containing specimens of moths, taken in Epping during this year, including *Dicycla oo*, L., and *Xanthia aurago*, Fb., and a very curious pale form of *Amphipyra pyramidea*, Och.

Mr. T. V. Holmes then read the following paper :—"Report on the Denehole Explorations in Hangman's Wood, near Grays, Essex, during 1884 87. By T. V. Holmes and William Cole." The Report gave a full account of the work done under direction of the Denehole Exploration Committee, together with a summary of the opinions which had been held by various writers as to the objects of the makers of these pits. The report includes two short papers by Mr. Rudler and Mr. E. T. Newton.

A paper by Mr. F. G. Bennett, F.G.S., entitled "Notes on Chalk-Wells," was also read. This paper will be published as an appendix to the report on the deneholes.

Prof. Meldola (who took the chair during the reading and discussion of the report), in proposing a hearty vote of thanks to Mr. Holmes and Mr. Cole for their persevering efforts to solve the mystery of the Deneholes, and for the very clear and able manner in which Mr. Holmes had summed up the available evidence, said that although it was not usual to discuss a "Report" when presented to a Society, yet in view of the special circumstances of the case he thought they might break through the rule that evening. He thought that the report made out a very good case adverse to the well-known "chalk-pit" hypothesis, and that was an important conclusion, because he knew that several eminent anthropologists still clung to that explanation of the original intention of the constructors of the pits. He thought that the Committee had done all in their power in spite of the special difficulties of the problem, to effect a solution of it, and all who knew anything of that kind of work would agree that the explorers had earned a good title to the thanks of the Club. He would remark that in his opinion little reliance could be placed on fragments of pottery found in the pits as evidence of date; it was so easy for such things to fall down the shafts from above after the pits had been abandoned by their original makers.

Mr. F. W. Elliott said, that when staying in the neighbourhood of Burnham Beeches, Buckinghamshire, in 1884, he visited some tile-works near the "Yew Tree" inn, on the road to Beaconsfield, about midway between that town and Farnham Royal. The tile-yard was situated on the slope of a hill, which had been cut away to quarry soil for the purposes of the trade. In the level space thus formed were sunk five or six shafts, four to six feet in diameter, and lined with brick. Over one of the shafts a windlass was fixed; the others were deserted and overgrown with brambles, etc., but otherwise uncovered. The sound of falling water in some of the pits was audible. He could not get down any of the shafts, as the tackle had been removed when work had been suspended some weeks previously, in consequence of a sufficient stock of chalk having been accumulated. A workman said that each shaft was about 70 feet deep, that it penetrated about two yards into the chalk, and then opened out into a single bell-shaped cavity, wherein one man worked at filling the bucket with chalk, and then swung it into the centre to be drawn up to the surface. When the cavity got to be inconveniently large for one man to work, it was abandoned, and another shaft sunk. Mr. Elliott understood that in one or more instances water had come into the chamber, and forced the workmen to begin afresh. The chalk was, he understood, used for making lime, and was stated to be better than that to be obtained within two or three miles where it came close to the surface. Mr. Elliott argued that the existence of such pits as those he had described afforded some ground for the supposition that the Essex Deneholes had also been made for the purpose of getting chalk.

Mr. T. V. Holmes and Mr. Cole pointed out some of the many points of difference between the true Deneholes and the pits referred to by Mr. Elliott.[2]

Further remarks were made by Mr. Royle, Mr. Walter Crouch, Mr. White, Mr. E. A. Fitch, and others; and the thanks of the meeting were given to the reporters and to Mr. Bennett for their papers. Tea and coffee, etc., were served as usual at the close of the meeting.

[The Report with the appendices, including Mr. Bennett's paper, with illustrations, map, and plans, will be published in the December part of the ESSEX NATURALIST.]

Badgers in the Essex Islands.—With regard to the occurrence in recent times of this now almost extinct Essex animal, I find the following in Benton's "History of Rochford Hundred" (i. 197):—"In 1841, a badger was found in the sea-wall of White House Farm (Foulness), and one made his appearance in New England about the same time."—EDWARD A. FITCH, Maldon.

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[2] We have been favoured by Mr. Elliott with a statement of his arguments, but it would be manifestly inconvenient to print these before our readers have had an opportunity of perusing the report itself. A statement of the facts, and the conclusions to be drawn from them, in the opinion of the Reporters, will be appended in the Denehole Report; after the appearance of which any discussion of the subject will be permissible.—ED.

ESSEX FIELD CLUB SPECIAL MEMOIRS, VOL. I.

REPORT ON THE EAST ANGLIAN EARTHQUAKE OF APRIL, 22, 1884. By RAPHAEL MELDOLA, F.R.S., F.C.S., F.R.A.S., &c., Professor of Chemistry in the Finsbury Technical College, City and Guilds of London Institute; and WILLIAM WHITE, F.E.S., Member of the Geologists' Association. With Maps and other Illustrations. Price 3s. 6d.

The *Athenæum* says:—"A distinctly valuable contribution to our knowledge of a subject of much obscurity. . . . The subject is one which only a few specialists will pursue within its narrower limits, but the curious facts collected, and the odd scraps of history referring to past earthquakes which have been gathered together are so numerous, so unexpected, and so well set, that the book will be found extremely interesting to the general reader, as well as a suggestive and severe study for the man of science."

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Secretary and Surveyor.—HENRY ALLNUTT, ESQ.,
42, Essex Street, Strand, W.C., London,
And 3, Holland Road, Kensington, W.

Forthcoming Meeting of the Essex Field Club.

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ORDINARY MEETING.

SATURDAY, DECEMBER 17TH, 1887.

THE EIGHTY-FOURTH ORDINARY MEETING of the Club will take place at the PUBLIC HALL, LOUGHTON, ESSEX, on SATURDAY EVENING, DECEMBER 17th, 1887, at Seven o'clock.

Following Exhibitions, etc., will be read :—

"A SHORT SKETCH OF THE WHALE LATELY CAST ASHORE AT TILBURY, ESSEX." By F. H. Davies, M.D., etc.

After which a LECTURE will be given on :—

"THE LONDON CLAY."

BY

F. W. RUDLER, ESQ., F.G.S., etc.,

Curator of the Museum of Practical Geology, and Director of the Anthropological Institute of Great Britain.

At the above Meeting, in accordance with Rule VI., nominations must be made of Candidates to fill the offices of President, Treasurer, Secretary, Assistant-Secretary, Librarian, and Assistant-Librarian, and vacancies on the Council, for the ensuing year, and in preparation for the Annual General Meeting, to be held on Saturday, January 29th, 1888.

It will also be the duty of the Members to appoint an Auditor of the Treasurer's Accounts ; Mr. Walter Crouch will act on behalf of the Council.

Mr. James E. Lickfold, 145, Camden Road, stands for election as member at the Meeting.

WILLIAM COLE,
Buckhurst Hill, Essex. *Hon. Secretary.*

SUPPOSED EARTHQUAKE SHOCK IN ESSEX.

We have received several reports of a supposed Earthquake, which was felt on Sunday Morning, November 20th, on the borders of Cambridgeshire, Herts and Essex, and also in Bedfordshire. We shall be glad to have any notes or newspaper cuttings referring to the shock, for a record of the phenomenon in the pages of the ESSEX NATURALIST.

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The
Essex Naturalist:

BEING THE

JOURNAL ["TRANSACTIONS" AND "PROCEEDINGS"]

OF THE

ESSEX FIELD CLUB.

EDITED BY

WILLIAM COLE,

Honorary Secretary.

Contents:

	PAGE
Report on the Denehole Exploration at Hangman's Wood, Grays, 1884 and 1887.—By T. V. HOLMES and W. COLE (*with three coloured plates and other illustrations*) ..	225
Note on the Bones found in the Deneholes in Hangman's Wood.—By E. T. NEWTON, F.G.S., F.Z.S.	257
Note on a Fragment of Millstone from a Denehole.—By F. W. RUDLER. F.G.S. ..	259
On Chalk Wells.—By F. J. BENNETT, F.G.S. (*with two illustrations*)	260
Note on some Pits near Chipping Norton, Oxfordshire.—By H. B. WOODWARD, F.G.S.	265
Ensilage, or Preserving Grain in Pits.—By F. C. J. SPURRELL, F.G.S...	266
The Essex Field Club—Reports of Meetings	277
Notes	280

The authors only are responsible for the statements and opinions contained in their respective Papers.

N.B.—Title-page and Index to Vol. I. will be issued with the January Part.

PUBLISHED BY THE CLUB, BUCKHURST HILL, ESSEX.

1887.

[Ent. Stationers' Hall.]

All Communications should be Addressed:—
The Editor of "THE ESSEX NATURALIST,"
7, Knighton Villas, Buckhurst Hill, Essex.

Forthcoming Meeting of the Essex Field Club.

◆◆◆

THE EIGHTH ANNUAL GENERAL MEETING of the Club will take place at the PUBLIC HALL, LOUGHTON, ESSEX, on SATURDAY EVENING, JANUARY 28th, 1888, at Seven o'clock.

A circular relating to the official business of the meeting is sent to each member with the present issue of the ESSEX NATURALIST.

An Address will be delivered as follows:—

"The Subterranean Geology of South-Eastern England."

BY

T. V. HOLMES, F.G.S., M.A.I.

SYLLABUS:

Geological maps show rocks on the surface at a given spot—Knowledge of Subterranean geology depends partly on the evidence afforded by the disposition of the surface rocks, partly on that of deep borings—The geology of South-eastern England as shown on a geological map—The evidence of districts outside; of Belgium, the Boulonnais and Western England; bearing upon the geology of S.E. England—Of deep borings—Conclusions.

The address will be illustrated by many maps and Geological "Sections."

WILLIAM COLE,

Buckhurst Hill, Essex. *Hon. Secretary.*

"THE ESSEX NATURALIST."

The journal of the Club is now issued as a *monthly illustrated periodical* under the above title, which is sent *post free* to all members. The volume for 1887 contains 280 pages of interesting and original matter, relating to the Geology, Pre-historic Archæology, and Natural History of Essex, with five plates, and numerous illustrations. The Editor will be glad to receive contributions of papers or notes on the above-mentioned or cognate subjects. *Address:* The Editor of "The Essex Naturalist," at the temporary Head Quarters of the Club, 8, Knighton Villas, Buckhurst Hill, Essex.

REPORT ON THE DENEHOLE EXPLORATION AT HANGMAN'S WOOD, GRAYS, 1884 and 1887.

By T. V. HOLMES and W. COLE.

[*Drawn up by* T. V. Holmes. *Read November 12th*, 1887.]

With Plates III., IV. and V.

Entrance to Hangman's Wood, from Grays. From a drawing by H. A. Cole.

[In presenting this Report to our readers, it has been considered desirable to print with it several papers treating of matters pertinent to the subject in hand, which have been kindly supplied by the several writers mentioned below. These papers may be read as Appendices to the Report, and for convenience of reference, their titles are here given in the order in which they are printed :—

REPORT. With three Plates and other illustrations.

Addenda. *(a)* "Notes on some Chalk-wells in Buckinghamshire."
(b) "List of Subscribers to the 'Denehole Exploration Fund.'"
(c) "Explanation of the Plates."

APPENDICES. I.—"Note on the Bones found in the Deneholes in Hangman's Wood." By E. T. Newton, F.G.S., F.Z.S.
II.—"Note on the Fragment of Millstone from a Denehole." By F. W. Rudler, F.G.S.
III.—"On Chalk-wells." By F. J. Bennett, F.G.S.
IV.—"Note on some Pits near Chipping Norton, Oxfordshire." By H. B. Woodward, F.G.S.
V.—"Ensilage, or Preserving Grain in Pits." By F. C. J. Spurrell, F.G.S.

A large amount of information as to the nature of the Deneholes in Essex and Kent will be found in Mr. F. C. J. Spurrell's paper on "Deneholes and Artificial

Caves with Vertical Entrances" ("Archæological Journal," 1881); in Mr. T. V. Holmes's papers "On Deneholes" (Trans. Essex Field Club, iii. 49), and "Miscellaneous Notes on Deneholes" (Trans. Essex Field Club, iv. 87), and in Mr. W. Cole's reports of the visits of the Club to Hangman's Wood in 1882 ("Proceedings of the Essex Field Club," iii., pp. 28 and 56, and iv., page 20). —ED.]

HAVING been empowered by the Denehole Exploration Committee, in the Summer of 1884, to carry on the work at Hangman's Wood, we began operations there on Oct. 13th, and carried them on during the next four weeks. It was then deemed advisable, for many reasons, to leave off work for the season, in the hope of being able to resume it in the following spring. Various circumstances, however, prevented us from going on with it in the years 1885 and 1886. Having been able to continue our investigation this year for a fortnight, and having at length brought it to a certain degree of completeness, we have pleasure in laying before you the following account of our work and its results. In this Report the whole of our labours are described, whether executed in 1884 or in the present year. And in giving this account of them, we have thought it better to state the nature and results of each kind of work in turn, rather than to present the details in chronological order, a confused impression being almost inseparable from the latter course.

We began with four men, two above to work the winding-up apparatus, and two below to tunnel through the chalk. Fixing upon the open-shafted pit, styled No. 3,[1] as the best base of operations, our first work was to direct the two men below to tunnel in the direction of the shaft of the closed-up pit we have called No. 7, while we ourselves made a section across the conical mound at the base of the shaft of No. 3, on the side most distant from the tunnel. Finding, as the work proceeded, that it was desirable to have more men at work below, we increased the total number to six, and, at last to eight; while we employed the men above, in the intervals of winding, in digging trenches, from two to three feet deep, and about two feet wide, through the surface material. And two of the men usually below were occupied above ground for a day or two in endeavouring to ascertain whether a closed shaft, round whose mouth the surface depression was much slighter than usual, might not have been stopped up by rotting faggots supporting but a slight quantity of sand and gravel. For to open out a shaft thus closed would have been a most useful piece of work. Not only would the pit below have become open to inspection, but it would have formed a centre from which others, now closed, might have been entered by tunnelling, with the great advantage of an open shaft for ventilation. Thus our work was carried on both above and below ground.

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[1] The numbers given to the pits are purely arbitrary, and denote the order in which they were entered during the explorations. See plan on plate. iv. and map on plate iii.

In this Report we shall, in the first place, deal with the surface work; secondly, with our tunnelling and its results; and thirdly, with such examination as we have been able to make of the heaps of sand and gravel which cover the floor of each denehole. In our concluding remarks we shall discuss the evidence bearing upon the age of the deneholes and the purposes of their makers.

Firstly, as to our surface work. In the space between the shafts of the pits numbered 7, 8, 9, 10 and 11, we had a trench cut about two feet broad, two feet six inches deep, and twenty-five yards long; while another, about fifteen yards long, was made on the western side of the open-shafted pit No. 5. No human relics were observable in either case. But we saw that when the shafts were sunk the gravel, first removed, had been spread very evenly over the adjacent surface, and that the Thanet Sand beneath had then been treated in like manner, so as to preserve the original flattened contour of the ground. Not a single fragment of chalk could be seen. Of course chalk is a much more soluble material than sand and gravel, but had heaps of it even two or three feet high, out of the thousands of tons extracted, been allowed to remain here and there they would hardly have been dissolved away entirely, leaving no trace behind. This care shown by the denehole makers for the even diffusion of the sand and gravel and the removal of the chalk—which, when fresh cut, is a singularly bright and conspicuous material—seems to imply a strong desire to preserve secrecy as to the positions of these pits.

Our other surface operation consisted, as already stated, in an endeavour to open out a shaft from the top. That fixed upon is some distance eastward of the group we have opened out (see Map of the Wood on Plate iii.) and promised, from the slightness of the depression round it, to repay our exertions by disclosing an easily unstopped shaft above an unchoked denehole. But digging showed that the shallowness of the hollow was apparently due to artificial filling in of a more solid kind than we had anticipated. We were informed, indeed, by agricultural labourers and others, who had resided many years in the district, that many shafts had been filled up within their recollection.[2] And the shaft in question, being close to a somewhat ill-marked footpath may, if open in the earlier years of the present century, have proved itself much more dangerous to man and beast than shafts either near a well-defined road like Nos. 1, 2, 3 and 4, or at some little distance from roads and footpaths, like No. 5.

The tunnels driven from No. 3, our base of operations, have enabled us to connect together fourteen different deneholes including that from which we started. The visitor to No. 3 now finds three different courses before him (see Ground-plan on Plate iv.). He may leave it by the southerly tunnel which admits to the open-shafted Nos. 2 and 4; by the easterly tunnel which allows entrance to the closed pits 7, 8, 12 and part of 13; or by the northerly tunnel which gives admission into the closed pits Nos. 9, 10, 11 and parts of 6, 14 and 15, also into the open-shafted No. 5. The only other open-shafted pit at present existing in Hangman's Wood (No. 1,

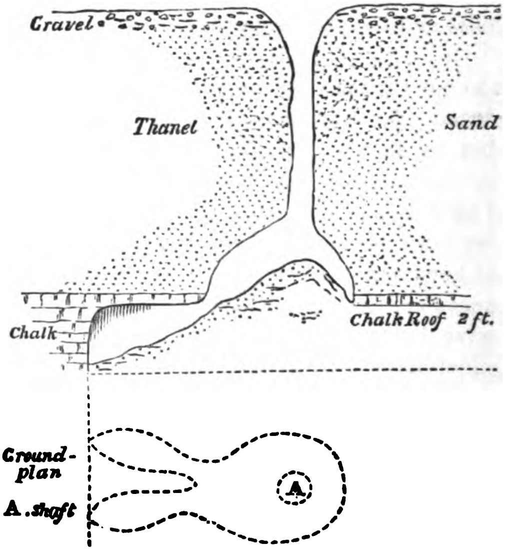

Fig. 2.—Denehole ("No. 1") in Hangman's Wood. Scale, 1 in. = 40 ft. (*The ground-plan is purely conjectural, the fall of the roof preventing a survey being made; in all probability there were originally other chambers.*)

---

[2] It should be noted, however, that we found no evidence of such artificial filling in having been employed to close any of the pits to which we gained access—the cone of earth which had accumulated in each case appeared to have been the result of slow and natural denudation from the sides of the shaft, etc., during the lapse of many years. See *post.*—Ed.

fig. 2) was considered to be too much filled with sand, in consequence of heavy falls from the roof, and too generally insecure to repay the trouble of connecting it with No. 4.

The southerly tunnel admitting to the open shafts Nos. 2 and 4, in addition to the power it gave us of working in those pits without a second winding-up apparatus, greatly improved the air in all three of these open-shafted deneholes, a current of air descending the cooler shafts and ascending the warmer shaft near which lights were burning and men at work. This enabled the work to be carried on with much increased vigour. For though even the closed pits have always been found perfectly easy to breathe in as soon as they could be entered, yet the stagnation of the air in such pits made the most moderate amount of work in them extremely fatiguing. And there was some approach to stagnation, even in the open-shafted pits, before the existence of the tunnels connecting them.[3]

The open-shafted pits having all been visited and described in previous years (*vide* papers in Trans. Essex Field Club mentioned above), little need be said about them till we come to consider the mounds and their contents. These we removed in Nos. 2, 3 and 5, leaving that in No. 4 untouched, the presence of large pipes in the latter pit making it somewhat unsafe to work in. Another pipe had been the cause of a considerable downfall of sand from the roof of No. 2, at the end most remote from the tunnel between 2 and 3. And at the side of the end of No. 2 and close to this downfall, we found an irregularly shaped hole of considerable size, which is noteworthy as the only example yet discovered of an excavation distinctly out of harmony with the original plan. Many inscriptions figure upon the walls of these open pits, the most ancient of those apparently genuine being in No. 2, and bearing the date 1750.

We may now leave No. 3 by the easterly tunnel to visit Nos. 7, 8, 12 and 13. We found No. 7 very full of sand and gravel, and its floor from two to three feet higher than that of No. 3, the apex of the roof showing apparently the same band of flints in each case.

---

[3] The purity and comparative freshness of the air (even in the closed pits when first entered) has been before commented upon. There was no indication of the presence of the deadly "choke-damp," commonly found in the stagnant air of old wells and pits. It is reasonable to suppose that quantities of carbon dioxide and other gases would be set free during the decomposition of the vegetable and animal refuse which had fallen into the pits, and it was suggested, as a possible explanation, that the damp chalk might itself absorb the gas as fast as it was set free, forming a double carbonate of calcium ($Ca\,H_2\,(C\,O_3)_2$), a salt supposed to be produced when carbon dioxide gas is passed in excess into lime water. An experiment made in Prof. Meldola's laboratory, however, seems to show that wet chalk exerts no such absorbent power. A piece of chalk was kept over mercury in an atmosphere of moist carbon dioxide for a fortnight, but no absorption could be detected. The cause of the absence of bad air in the pits has still, therefore, to be discovered.—Ed.

With some difficulty we cleared the greater part of the floor of the chamber nearest to No. 3, and then found its height to be about 14 ft. 6 in. The accumulation of material in this shaft-closed pit obliged us to tunnel from a recess towards the end of one of the lateral chambers to the corresponding chamber on the other side of the shaft in order to get access to the whole of the pit. The tunnel being completed, we found that the three chambers of No. 7 most remote from No. 3 differed from those first entered in having no side-recesses towards their ends. We also discovered that the partition between Nos. 7 and 8 had been broken, and that we could get through into the three nearest chambers of the latter pit. The hole in the partition was nearly circular in form, and about 6 ft. in diameter, and, were the floor cleared of debris, would be seen to have its base some 7 or 8 ft. above it. The adjacent chambers on both sides were carefully rounded off, and the break had the appearance of being entirely the result of accident, and contrary to the wishes of the original makers. We were again obliged to tunnel in order to get into the chambers on the other side of the shaft of No. 8. We then discovered that the existence of a similar but smaller hole in the partition between Nos. 8 and 12 gave us admission to the latter. In this case the rounding off and apparent completion of the adjacent chambers of the two pits previous to the break in the partition were even more strongly marked than in the preceding one. On both sides we had the somewhat steep slope usually seen at the ends of denehole chambers—slopes up which fallen dogs or badgers would instinctively climb—as their claw-marks in such positions abundantly testify. Indeed it seems quite possible that holes such as those between Nos. 7 and 8, and Nos. 8 and 12 may have owed their origin, though not their present development, to the frantic exertions of imprisoned animals.

Another break in the partition between Nos. 12 and 13 admitted us to a single chamber of the latter, the only one at present open to us, this pit appearing to be too much choked up by debris to be worth any attempt at further exploration. But we obtained admission to the whole of No. 12 by means of a tunnel connecting the two chambers nearest to No. 8, and found it to be entirely exceptional in plan. In No. 2 we have a pit of the same nature as the ordinary six-chambered pits, but with only five chambers actually excavated, the sixth being represented only by a slight recess. But in No. 12 the two primary chambers, that leading to No. 13 and the corresponding one on the other side of the shaft, are by no means so nearly in a straight line as usual, the difference amounting to about 15 degrees, while the usual limit is about 5 degrees. And the two lateral chambers excavated are both on the same side of a line bisecting the primary chambers, no traces of corresponding chambers on the other side being visible. The existing chambers are long, rather narrow for their length, and with slight, irregularly-placed recesses in their sides. A four-chambered pit like this is quite exceptional at Hangman's Wood, according to our present experience, and none appear to have been seen by Mr. F. C. J. Spurrell during his researches at Bexley. It is therefore worth noting that the remarkable pit at Eltham, discovered in 1878 and described by Mr. Flinders Petrie ("Archæological Journal," vol. xxxv.), had its shaft in a similar position, and is probably but a further development of a pit originally like our No. 12. In the Eltham example the roof is supported by three pillars, which are almost central, while none exist in No. 12. But it is obvious that

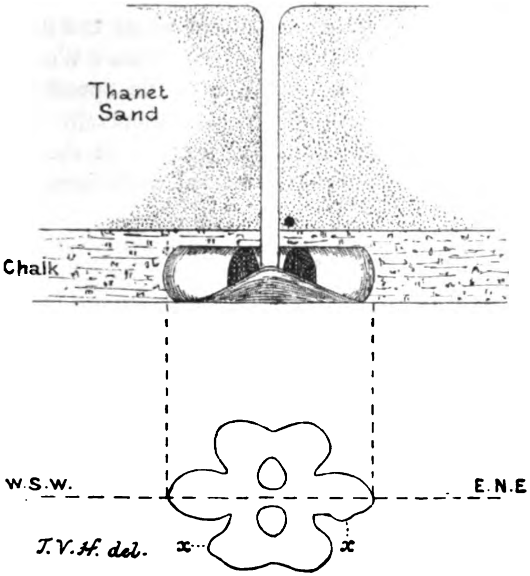

FIG. 3.—Denehole at Cavey Spring, Bexley. Scale 40 ft. to the inch.
"x." "x." Points at which the next pillars were being made.

Length of chamber from W.S.W. to E.N.E. ..	42 ft. 6 in.
Height	11 ft. 6 in.
Depth to bottom of chamber, from surface	61 ft. 6 in.
Thickness of chalk roof	3 ft. 6 in.

the further development of No. 12 by the removal of most of the chalk which now separates its chambers, would eventually produce a pit having its roof supported by three nearly central pillars, situated near the present points of junction of the chambers. It is somewhat singular that neither in No. 12, nor in any other of the Hangman's Wood deneholes, have we met with a pit in its last stage of development, that in which most of the partition between each chamber has been removed, only enough chalk being left towards their present entrances to serve as pillars for the support of the roof. In the similar groups of deneholes at Stankey, and Cavey Spring, Bexley, pillars are found where the dimensions are much less than those common at Hangman's Wood. The first pillars made were always on each side of the opening at the base of the shaft, a six-chambered denehole eventually becoming six-pillared. In the example given (Fig. 3) of one of the Cavey Spring pits, two pillars have already been formed, and others are in process of formation; in the Stankey pit (Fig. 4) one pillar only has been formed, the second being nearly completed. In both cases the lateral expansion is much less than that of the Hangman's Wood pits, a fact which the identity of the scale used (40 ft. to an inch) makes very obvious.

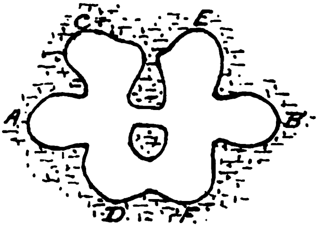

FIG. 4.—Ground-plan of Pit at Stankey Wood (W. of fence), visited by the Sidcup Literary and Scientific Society, June 6th, 1885. Scale 40 ft. to an inch.

Greatest length A to B about 52 ft. 6 in.
" " C to D " 36 ft. 6 in.
" " E to F " 36 ft. 6 in.
Height .. .. 18 ft.–

We may now start from No. 3 by the northerly tunnel, and visit Nos. 9, 10, 11, 5, 6, 14 and 15. As No. 9 is a shaft-closed pit, we had no knowledge of the positions of its chambers, and could only direct our tunnel towards its shaft. On entering No. 9 we discovered that a rat-hole connected the two pits a few feet to the right of our tunnel and about the centre of the ends of the two contiguous chambers, the thickness of the partition at the rat-hole being about

18 inches. Unfortunately, the existence of this rat-hole was not revealed to us till there were lights in both these adjacent chambers. In this case, of course, the interest lies in the thinness, yet perfect preservation, of the partition. The position of this rat-hole is precisely similar to that of the very much larger holes between Nos. 7 and 8 and Nos. 8 and 12, and it was curious to notice around the rat-hole the claw-marks of large dogs, badgers, and other much more powerful animals than rats. In this case the partition had remained firm; but similar assaults may often in other instances have proved successful, especially when each imprisoned creature naturally made for and attacked the same spot. No. 9 was found to be, as usual, a six-chambered pit, and we were enabled to enter the three on the other side of the shaft by means of a hole already existing between the two lateral chambers most remote from No. 3. Between Nos. 9 and 10 a broken partition—possibly caused by the pressure of rubbish from the side of No. 10—admitted us to the latter, but it became necessary to tunnel in order to secure a more trustworthy entrance than that obtainable by creeping through the mass of sand and gravel around the shaft. Another short tunnel gave access to the remaining chambers of No. 10. From this pit we tunnelled in two directions, on the one hand into No. 11, on the other into No. 5. By penetrating into the latter we obtained the advantage of a current of air from No. 3, through Nos. 9 and 10, No. 5 having an open shaft. A broken partition between Nos. 5 and 6 (see section on Plate iv.) gave us admission to the latter, the rounding off of the adjacent chambers of the two pits being as well-marked as in any of the instances already given. The two chambers of No. 6 nearest No. 5 both terminate at their distal ends in three rather deep recesses, while the third and only other accessible chamber of this pit is destitute of them. The tunnel through the sand which gave us access to this third chamber was one of our latest pieces of work, and was ventured upon in consequence of our seeing how well the vertical sides of the mounds had stood where we had pared them away in 1884. In this chamber we found evidence that the *débris* in No. 6 was the result not merely of falls down the shaft, but of the giving way of part of the roof of the pit. And at its mouth the probable cause of this downfall was shown to be the thinness of the chalk roof, which appeared to be about 15 inches. A hole in the side of this third chamber admitted us into two chambers of No. 15, which, however, appeared to be, like No. 6, a

much filled-up denehole, offering no field for exploration. The exact positions of the shafts of Nos. 6 and 15 would necessarily remain doubtful were we dependent solely on underground observations, but there is no difficulty in identifying them on the surface.

Having reached in No. 15 the remotest pit in this direction, we must now retrace our steps into No. 10, and thence into Nos. 11 and 14.

The short tunnel between Nos, 10 and 11 gave us admission into a somewhat exceptional pit, while another connecting the lateral chambers of No. 11 placed the whole denehole before us. Evidently intended to have been a six-chambered pit of the ordinary type, the existence of a large "pipe" in the Chalk had checked the formation of the more northerly of the two primary chambers. This pipe must descend 8 or 9 ft. into the chalk, or from 4 to 5 ft. lower than the pipes in Nos. 2 and 4. In consequence of its existence, the primary chamber in which it appears only attains a length of about 6 ft. 6 in.

On tunnelling from No. 11 to No. 14, the workmen met with another pipe. This long tunnel was decidedly the most unfruitful in results of any we have made. When we reached No. 14, we found the entrance barred by a mass of incoherent sand and gravel unsafe to tunnel through, and the end of which could not be ascertained by means of the auger. Turning to the left, we managed by means of a branch tunnel to penetrate into an almost filled up chamber, but further progress was again stopped by rubbish. We had, therefore, only to retire to No. 11, feeling much disappointed at the state of No. 14. For surface observations had shown us that the depression around its shaft was extremely slight and much below the average, the size of this hollow being usually a fair index to the amount of *débris* below. But in this case it would seem that, though the fall of material down the shaft had been slight, the collapse of part of the roof had taken place, a collapse that, as in No. 1, had been accompanied only by the formation of a subterranean dome in the Thanet Sand.

The chamber of No. 11, nearest to No. 10, being traversed by a single plank, the depth below which was from 5 to 6 ft., the workmen were directed, on October 7th (1887), to fill it up to some extent with sand from the mound around the shaft of No. 11, close by, so as to avoid the risk to our visitors at the Field Meeting of the following day of sprained ancles or broken legs. Excavating somewhat rashly, they caused a fall of sand, which enabled us to look up the shaft to a height of perhaps 15ft. above the roof of the chambers. We were surprised to find many rope-marks in the chalk of the shaft, close to the roof, just where they are common in the open shafts, and looking just as fresh and recent. The hole, some 2 ft. square, connecting the longest chamber of No. 11 with one belonging to No. 7, was cut on resuming our work this year. It was made partly to allow of a current of air through No. 11, in which we proposed to sift, partly to test the accuracy of the ground plan, which had been made in 1884, and which showed the two chambers in close proximity. As No. 7 was the first pit entered from No. 3, and No. 11 the last, the accumulation of small errors might easily have produced a considerable discrepancy between the plan and the real state of things. Fortunately, our test showed the substantial accuracy of the ground plan.

The chalk at Hangman's Wood appears to be lying nearly flat, a well-marked band of black flint being conspicuous from 5 ft. to 8 ft. above the floor in those pits not too much filled up to show it. The usual height of the chambers appears to be from 16 to 18 ft.; in No. 5 they were found to be from 21 to 22 ft. The thickness of the chalk roof varies from about 6 ft. to less than 2 ft.; perhaps the average is about 3 ft. The floor of adjacent pits seems to vary in depth from the surface from 2 to 3 ft., the total depth varying from 78 ft. to 81 ft., or thereabouts. Putting aside the long slope which often occupies a considerable area towards the distal end of a chamber, the floor has always been found to be quite smooth and nearly horizontal.

We have found the marks of metal picks to be equally common in the open and closed pits, their abundance and even distribution showing that these deneholes certainly owe their present forms and, in all probability, their origin to users of metal tools. In most of the pits, especially towards the roof, the pick-marks look very fresh. Around many are still sticking small patches of moist chalk which, clinging to the picks, had been cast off as the blows were delivered, and had thus bespattered the walls of the chambers.

The first mound examined was that at the base of No. 3.[4] Being anxious to note carefully the nature of the section it presented, we with the assistance of Mr. H. A. Cole, ourselves cut a trench across the mound to the entrances of the two lateral chambers farthest from the tunnels. We found the upper part of the mound was composed almost wholly of Thanet Sand with occasional pebbles, the lower consisting of gravel with a slight admixture of sand. The gravel formed a low cone, extending to the very ends of the chambers, the sand a much steeper cone of much smaller horizontal extent. Occasionally, lumps of chalk, the result of its weathering towards the base of the shaft, appeared here and there. Estimating the height of the mound below the centre of the shaft at 13 ft., we found that the upper 7 or 8 ft. were Thanet Sand with occasional pebbles, the lower 4 or 5 ft. gravel with a little sand. The concussions, resulting from persons ascending and descending, caused the mound to fall forward and fill up our trench, and we then obtained the assistance of additional workmen in order to remove the mound, the material being thrown into the lateral chambers, and the space below the shaft entirely cleared. We found that as we got nearer the floor the lumps of chalk became much more numerous, and that close to the shaft were great numbers of large flints, frequently more or less squared. There can be little doubt that these large flints had once been used for "steining" or lining the uppermost 6 or 8 feet of the shaft sunk through the surface gravel, which would be a most treacherous and dangerous material around the mouth of a shaft if unprotected by steining. And it is not unlikely that much of the chalk, so specially abundant close to the floor, had been used for the same purpose, courses of chalk having been found alternating with others of brick in the shaft at Eltham Park, already mentioned.

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[4] For plan and section of this pit see Trans. Essex Field Club, vol. iii., plate ii.

The history of the mound we had been examining had apparently been this. On the abandonment of the pit many centuries ago the "steining" at the surface had given way here and there, and, not having been repaired, this neglect had resulted in the total destruction of the "steining" in a comparatively brief period. The large flints and chalk lumps being the first material to fall, had no cone to roll down, and mostly remained on the floor at a short distance from the shaft. Then the gravel was rapidly denuded backwards till a slope was attained on which plants could grow, when the waste of the gravel gradually diminished till it almost entirely ceased. Lastly, we had above the gravel the Thanet Sand, the falling of which from the sides of the shaft appeared to have been the slow work of centuries. Nothing whatever in the section of the mound suggested that any influence but that of the weather had been concerned in its formation, except that now and then animals of various kinds had been thrown down or had fallen down the shaft, and had left their bones in various parts of the conical heap.

The mound in No. 2 was found to have been formed in a precisely similar way. Thanet Sand lay above gravel, and the large flints rested directly on the floor. But a small recess in the chalk on one side of the shaft in No. 3 was not represented by a similar hole in No. 2. This recess was about 1 ft. high in the centre, about 1 ft. 6 in. long and 1 ft. deep, and was about 2 ft. above the floor. The clearing away of the mound in each case showed the much greater suitability of the Thanet Sand than the chalk for a shaft descended by footholes. Blocks of chalk of very considerable size and weight had fallen irregularly from its once smoothed and squared surface at the base of the shaft, while the wear of the Thanet Sand above had been singularly even and regular, the growth of moss on its sides having tended very much to check denudation. In this respect, however, the shaft of No. 3 is inferior to those of either No. 2 or No. 4. For the footholes are almost entirely gone in No. 3, while in No. 4 (where the mound yet remains untouched) Mr. R. M. Christy ascended and descended several feet by their aid.

The composition of the mound in No. 5[8] was precisely like those of Nos. 2 and 3, except that fewer large flints were found at the bottom. Possibly in this case more chalk and less flint had been used for steining. The height of the mound was fully 18 ft. All these mounds must have been considerably increased during the centuries of their formation by the mere fall of the dead leaves which collected in the funnel-shaped opening at the surface. But while fallen animals are more or less represented by bones, usually soft and decaying, the vegetable matter has simply imparted a darker colour to the Thanet Sand, or formed a dark earthy patch where present in unusual quantity.

During the clearing away of the mound in No. 3 many bones were seen at various levels, and these, together with others found elsewhere in the deneholes, have been kindly determined for us by Mr. E. T. Newton, Assistant Naturalist to the Geological Survey, who visited us more than once for that purpose (see Appendix I., *post*). Experience having showed that it was unnecessary to attempt any sifting of the upper parts of the mounds, we contented ourselves with securing and putting aside any bones which might be turned up in that part of them, reserving the lowermost two feet, or thereabouts, of the heap for more careful examination in the following way. As each spadeful was cast upwards into the barrow we turned it over with short-handled rakes, holding candles in our other hands to ensure as much light as possible. When full, the contents of the barrow were pitched into one of the side chambers, and so on. In the heap, but at various heights above the floor, were bones of the ox, horse, sheep, dog, and badger; also, two femurs, a tibia, and some smaller human bones, apparently those of a man. These human bones may possibly form part of the skeleton mentioned by Mr. Cole in our "Journ. of Proceedings," vol. iii., pp. 31, 32. There we read a quotation from the "Cambrian Register" for 1818, to the effect that a gentleman of the Cathedral of Canterbury, accompanied by a surgeon and a peasant, formed the "extraordinary resolution" of descending one of the Hangman's Wood pits. The peasant was lowered down first, bearing a light, which speedily became extinguished. On being joined by his companions he was found to be in a state of extreme terror from a fancy that he had seen another pit still more awful and profound yawning to receive him. His fears were by no means removed on the arrival of another light, as he then saw that he had been standing on a skeleton of gigantic size, most of whose bones he had trodden to pieces in his agitation. This skeleton they conjectured had been there many years, as on being rudely touched it crumbled to pieces. The skull being unusually large, the surgeon enveloped it in his handkerchief for removal, but smashed it against the sides of the shaft while reascending. It seems therefore not unlikely, to say the least, that the femurs and tibia we found were once part of this skeleton, and are some of the bones which fortunately escaped from the ravages of those destructive influences, the surgeon and the peasant. It is true that the pit is described in the "Cambrian Register" as four-chambered, and that No. 12 is the only pit we have entered that could be so described, but the party seem to have been so excited, and so badly provided with lights, that an inaccuracy of this kind is quite possible as the result of over hasty observation or imperfect memory. The remains of a horse were found close to those of the man, together with part of an antique-looking bit. Two pieces of pottery were found in this mound, in the gravel, about two feet above the floor. Mr. Franks and Mr. C. H. Read, of the

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[8] In order to give those who had not an opportunity of visiting the deneholes during our explorations, an idea of their actual appearance, we reproduced a drawing of No. 5 pit (Fig. 5), kindly furnished by Mr. H. A. Cole. The time chosen for the making the sketch was when the removal of the cone of earth had been nearly completed, and the spectator is supposed to be standing in the primary chamber of the pit most remote from No. 6. The accidentally formed opening into the latter pit, referred to above (page 233), is seen in the distance.—Ed.

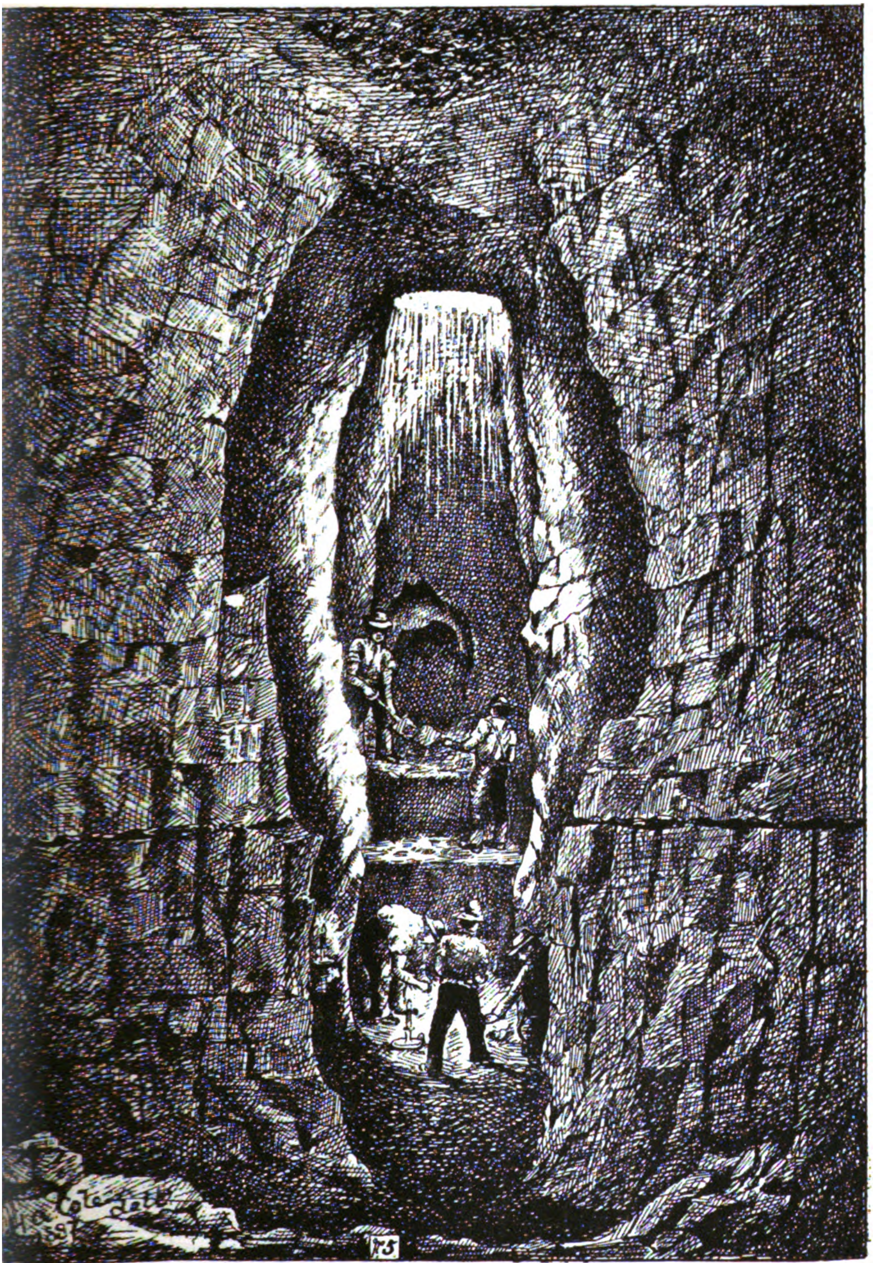

FIG. 5.—Denehole No 5, viewed from one of the primary chambers during the removal of the cone of earth. From a drawing by H. A. Cole.

British Museum, agree in determining them to be mediæval, possibly as late as the 16th century.

Examination of the mound in No. 2 showed at various levels bones of the ox, sheep, dog, and other animals, but none calling for especial remark. But slightly above the floor, and at the corner of the slight recess which represents the sixth chamber, were some fragments of pottery. Two of them were rough, reddish pieces, with regard to whose age Messrs. Franks and Read could form no decided opinion. The others were fragments of a vase, black internally but with a yellow glaze externally, which they thought dated probably from the 14th century.

The mound in the third open pit, No. 5, yielded many bones of horse, ox, sheep, dog, rabbit, and other animals, and, in addition, a fragment of Niedermendig lava, which had probably once formed part of a millstone. This fragment was towards the distal end of the primary chamber most remote from No. 6. Nothing worth notice was found near the shaft

We may now turn to the sifting in the closed pits. In their case we did not, of course, meddle with the material close to the shaft, but were obliged to work from the end of a chamber towards its mouth; preventing the fall of sand and gravel into the cleared part by means of strong timber placed across the mouth of the chamber. Three chambers have thus been cleared, that of No. 7 nearest No. 3, one of No. 10, and the greater part of the longest chamber of No. 11.

In the chamber of No. 7 the bones of a small horned sheep were found not far above the floor. The other bones were chiefly canine. A small fragment of very rude pottery which was discovered on, or close to, the floor has been examined by Messrs. Franks and Read, and pronounced by them to be certainly primitive British ware, similar to one kind of rude "late Celtic" pottery found in Loughton Camp, recently explored by the Essex Field Club.

The chamber of No. 10, which has been cleared, is that which lies on the left hand of the visitor who faces the tunnel from No. 10 to No. 5, and has the shaft of No. 10 at his back. On the floor was almost the entire skeleton of a horse. But the most interesting discovery was that of a piece of Niedermendig lava, which had evidently formed part of a millstone according to the opinion of Messrs. Franks and Read. Millstones of this rock were very largely, though not exclusively, imported into this country by the Romans (see Appendix II., *post*).

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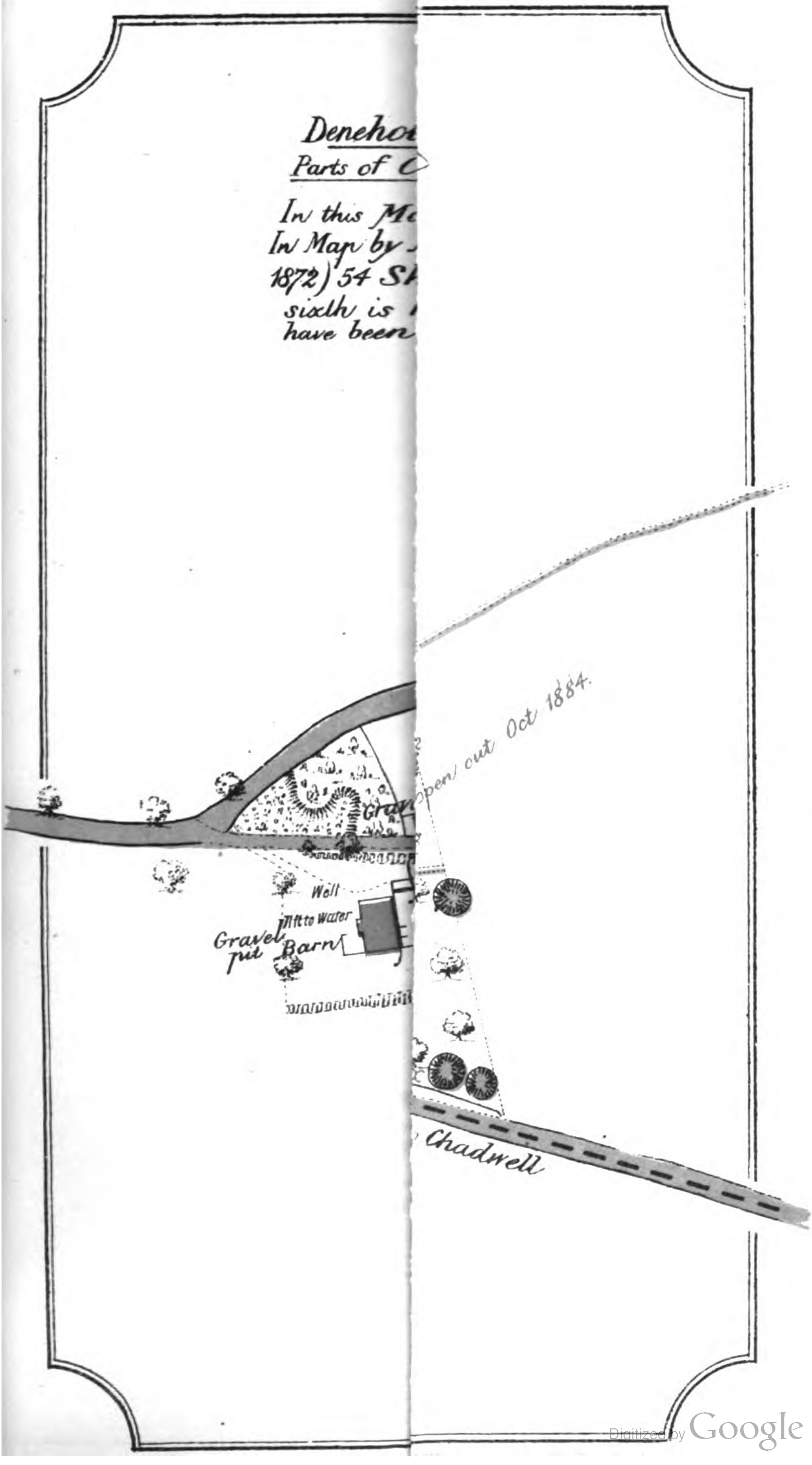
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open out Oct 1884.
Grav
Well
Lift to Water
Gravel pit
Barn
Chadwell

It had been intended to sift the whole of the longest and possibly one of the other chambers of No. 11, that pit being less filled up with rubbish than usual. Unfortunately it soon became evident that the chalk between the mouths of its chambers—where it generally breaks away much more rapidly than elsewhere—was so shattered and full of cracks that it would be unsafe to remove the sand and gravel from that quarter. We were accordingly compelled to content ourselves with an examination of part only of the floor of the long chamber. Nothing of importance was found.

Wherever, as before remarked, we exposed the original floor of any part of a denehole we always found it very smooth and even and nearly horizontal. It was observable in the open-shafted pits, on the removal of the mounds, that the deneholes attained their greatest breadth at a height of 7 or 8 ft. above the floor. In No. 5 the narrowing of the pit below this height was more strongly marked than usual, and it is on that account that the area of floor examined seems so narrow in comparison with the breadth of the pit, as shown in the ground plan, which gives approximately the greatest length and breadth attained in each case.

Our last tunnels having introduced us to pits (Nos. 14 and 15) not more but much less suited to sifting operations than those we had already entered, and no other open-shafted pit remaining to form a new centre of work, it seemed best to bring our exploration to a close. In this view all the members of the Denehole Exploration Committee who visited Hangman's Wood on Saturday, Oct. 8th, 1887, concurred. We have now, in conclusion, but to sum up the results of our labours, together with the rest of the evidence available towards settling the question as to the age of these Hangman's Wood deneholes and the primary purposes of their constructors.

The soft but singularly coherent and easily worked limestone known as chalk has been much excavated both in ancient and modern times for a variety of purposes. In addition to open chalk quarries there exist in many chalk-bearing counties what are known as chalk-wells, of the construction of which Mr. F. J. Bennett, of the Geological Survey, has kindly sent us some interesting notes, which may be read in full in Appendix III. to this Report. Here our remarks about them shall be as brief as possible. These chalk-wells, according to Mr. Bennett's experience, exist where the chalk is bare or covered by other strata to a thickness not exceeding about fifteen feet; and are so worked that when the required amount of chalk for top-dressing has been obtained they fall in so as to leave a "dell" or hollow on the surface, so even and shallow as not to interfere with ploughing. The advantage of a chalk-well, as compared with a shallow chalk-pit, is that the surface of the chalk being often full of "pipes" containing sand or clay, or covered by a deposit of clay with flints of variable thickness, a dell resulting from a shallow open chalk-pit would often imply the removal of a considerable quantity of other material than chalk instead of the nearly pure chalk insured by the chalk-well. Mr. Bennett mentions that chalk-wells to obtain chalk for lime are often as much as sixty feet deep, and that when the chalk wanted for the time has been extracted they are sometimes bricked over at the top for safety. He also remarks that the method for obtaining chalk by means of chalk-wells appears to be more modern than that of making open pits, "perhaps only dating from the middle of the last century," though he has not been able to ascertain its exact age, and a correspondent of his thinks it only sixty or seventy years old in Berkshire. But the practice of using marl or chalk as a top-dressing is, as Mr. Bennett remarks, of very ancient date, and may go back to prehistoric times. The construction of chalk-wells, as compared with deneholes, is well illustrated in Mr. Bennett's diagrams.

A class of ancient pits in chalk which deserves mention in any discussion on the affinities of deneholes is that of which the ancient flint workings at Grimes Graves and Cissbury are the best known examples. A visit to Grimes Graves, near Brandon, on the borders of Suffolk and Norfolk, discloses a number of depressions at the surface like those surrounding the closed shafts in Hangman's Wood, but even closer together. Canon Greenwell states that they are about 254 in number, and generally about 25 ft. apart. In their case the object sought was a flint band 39 ft. from the surface, singularly well suited to the manufacture of flint implements. The shafts to this band vary in diameter from 20 ft. to 65 ft., and the flint forming their floor having been removed, galleries about 3 ft. high and from 4 ft. to 7 ft. wide, were driven in various directions, and the flint in them extracted, till the shafts were connected together by their means. The material taken from a new shaft went to fill up an old and exhausted one. The general arrangements at Cissbury appear to have been of a similar character. Above the chalk at Grimes Graves is a thickness of about 13 ft. of sand, at Cissbury but a few inches of soil. That these pits were primarily flint mines their construction, as revealed to us by Canon Greenwell, Lieut.-General Pitt-Rivers, and Mr. Park Harrison, makes certain.

We may now approach the pits known as "deneholes," "daneholes," or "danes-holes," which abound in certain parts of the chalky districts of Kent and Essex, and were once numerous on the Magnesian Limestone of the coast of Durham. The name means simply *den*-hole, from the A. Saxon *denn*, a cave. Mr. Skeat gives as cognate forms the O. Dutch *denne* and the German *tenne*, = floor, threshing-floor, cave. Pits in chalk having been sunk at various periods for various purposes, there are doubtless many here and

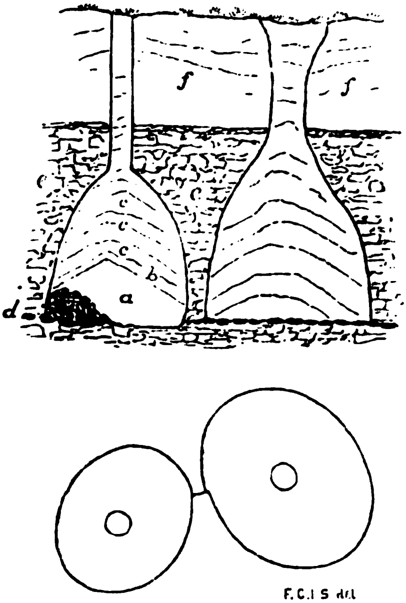

FIG. 6.—Shallow Deneholes near Crayford, Kent.[6]

a Neolithic layer
b Roman layer
c Post-Roman layer
d Stratum of flint
e Chalk
f Sand and Gravel

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[6] These pits were described by Mr. Spurrell ("Archæological Journal," vol. xxxvii., 333) in a note under the title, "Account of Neolithic Flint Mines at Crayford, Kent." The author in his paper on "Deneholes" subsequently corrected the erroneous description of these pits as "flint-mines." One of the pits measured from the surface of the ground to the chalk about 18 ft., thence to the floor 17 ft. 6 in. "From this floor rose an obtuse cone of sandy clay, very hard, six feet high, washed in very slowly and evenly by the rain. In the cone were found several flakes, worked scrapers and a 'core,' but no pottery; above this lay coarser soil, several sorts of pottery, some made with shells, some with chalk, and ornamented by the finger-nail; higher up still Roman pottery, a fine Samian plate, and bones and rubbish to the surface." Among the bones were those of a small deer, and *Bos longifrons*, and there were plenty of shells of the banded snail, and oyster shells, both apparently the remains of food.—ED.

there which have been modified from time to time in such a way as to render it impossible to ascertain their age or the purpose of their original excavators. But all persons would unite in considering the collections of pits at Hangman's Wood and at Stankey and Cavey Spring, Bexley, to be deneholes, and would add to them the isolated pits of the same kind scattered singly, or in groups of twos and threes, in the neighbourhood of these larger collections and elsewhere. Nor would many refuse to add to the above the various pits of lesser depth and simpler form, also frequently found in groups of twos and threes, as well as singly, where the chalk is at, or within 15 or 20 ft. of, the surface. Of this last class the pair of pits examined by Mr. F. C. J. Spurrell at Crayford in Kent, which are here figured, Fig. 6, are good examples.

It is evident that one of the most distinguishing characteristics of both the above varieties of deneholes is the vertical entrance. This, however, though a leading feature in the chalk counties, is not found in the deneholes of Durham. Mr. R. O. Heslop, an active member of the Newcastle Society of Antiquaries, pointed out to us three or four years ago that an eminent northern antiquary, Mr. W. H. D. Longstaffe, had mentioned these Durham deneholes in his very interesting paper on "Durham before the Conquest," read at the Newcastle meeting of the Archæological Institute in 1852. Mr. Longstaffe, after remarking that the name "Danes Hole" is applied to several hiding places in the county, and that it may perhaps have had its origin in the times of warfare between Saxon and Dane, from their use as places of retreat from the latter, states:—"They are frequent in Hartness, where the struggle seems to have been most bitter, and are described as excavations in the sides of eminences, in those sides from which the most extended views might be obtained." On the map accompanying Mr. Longstaffe's paper, the words are seen "Excavated halls called Danes Holes;" and they are marked as existing on the Magnesian Limestone of South Durham chiefly in the neighbourhood of Embleton, six or seven miles west of Hartlepool.

These Durham deneholes or Danes-holes may, of course, have been *den*-holes constructed during the Danish inroads of the 8th and 9th centuries, or may be excavations of a much earlier date, put to their last important use about that time, there being no evidence as to their approximate age. On the other hand, in the case of one of the Crayford pits already mentioned, Mr. Spurrell's examination showed that it dated from the Neolithic period, and it seems likely that many of the simpler and shallower deneholes do the same. It has always naturally been assumed that the deeper deneholes, such as compose the groups at Cavey Spring, Stankey and Hangman's Woods, would prove to be of later date, as those which have been visited have always shown an abundance of metal pick-marks. Previously, however, to our tunnelling operations in Hangman's Wood, only the open-shafted pits, which form from five to ten per cent. of the total number in each group, had been visited, either at Bexley or at Grays, and consequently it was quite possible that we might have discovered in some of the shaft-closed pits indications that the open pits had all been worked over by people living at a much later date than the original constructors. This point could not have been satisfactorily settled without the inspection of a considerable proportion of the pits, for 50 or 100 years ago many of the shafts now closed were open, a writer in 1867[7] stating that at least twice the present number of pits were accessible "within the last few years" at Hangman's Wood. But in addition to the total absence of flint flakes in the mounds, there was nothing in any of the pits we entered suggesting that particular examples had been seriously modified in any way. In each there seemed a unity of design and an even distribution of pick-marks, quite unlike what would have shown itself had any serious enlargements been made by men with new views, careless of the original system of excavation. To mediæval seekers after treasure we may not improbably owe something of the dearth of human relics on the floors of the Hangman's Wood pits, but these gold hunters do not seem to have anywhere interfered with the pre-existing symmetry, possibly because iron pyrites is very rare at Hangman's Wood. For that mineral, occasionally abundant in chalk, has frequently, from its bright yellow, metallic appearance, been mistaken for gold. Each denehole may have taken as long to excavate as a mediæval cathedral to build, but the deneholes, unlike most cathedrals, show no signs of diversity of style. Our exploration, therefore, has made the post-Neolithic age of the Hangman's Wood pits almost certain.

But though evidently post-Neolithic, the available evidence bearing on the approximate age of the Hangman's Wood pits still leaves much to be desired.[8] Dr. Robert Plot, in his "Natural History of Oxfordshire," published in 1705, remarking on the probable existence of mines of the precious metals in Oxfordshire, says that there may once have been a mine in a certain locality in that county though the site may have been lost like "the gold mine of Cunobeline in Essex, discovered again *temp.* Henry IV., as appears by the king's letters of Mandamus, bearing date May 11th, An. II., Rot. xxxiv., directed to Walter Fitz-Walter concerning it, and since then lost again." And according to a writer in the "Cambrian Register," the gold mines in Orsett, East Tilbury, and some of the neighbouring parishes, were actually worked at the commencement of the 15th century with some degree of success by the royal favourite above mentioned. There can be little, if any, doubt that the "gold mines" of East Tilbury were the deneholes known to exist there, Camden's figures of two of which were reproduced and described in the ESSEX NATURALIST for Sept., 1887 (vol. i. page 188), and are again shown here, Fig, 7. And the "gold mines" of Orsett can hardly fail to be our Hangman's Wood pits, which are partly in the parish of Orsett and partly in Little Thurrock. The above particulars have a special interest for us here, as they show that in the time of Henry IV. these deneholes were traced back by tradition to the most powerful of the

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[7] "Building News," Feb. 1st, 1867. [This statement of the writer in the "Building News" should perhaps be received with caution. As before stated, we found no evidence of artificial "filling-in," and a gentleman well acquainted with the locality assured us that it would not "pay" to attempt doing so. We shall be glad to receive any evidence obtainable on this point. —Ed.

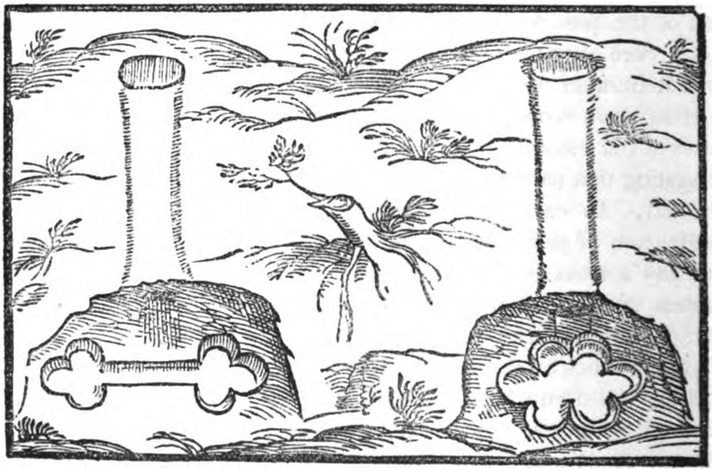

FIG. 7.—The ancient Deneholes at Tilbury, Essex; from Camden's "Britannia" (1610).

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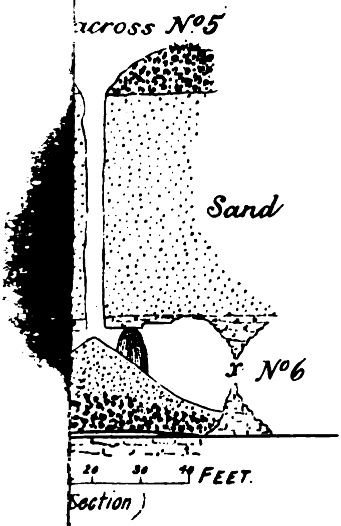
[8] For some account of the literature of Essex deneholes see Journ. Proceedings E. F. C. vol. iii. pp. 29—34.

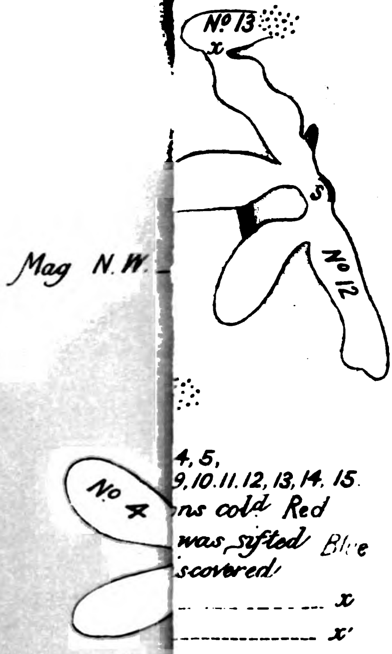
British kings in the period between the expeditions of Julius Cæsar B.C. 55 and 54 and the beginning of the Roman occupation A.D. 43, a king whose capital was Camulodunon or Colchester. And when we consider the greatness of the changes, ethnological, political, and social, that had taken place between the reign of Cunobeline and that of Henry IV., this tradition seems specially important and interesting; for, while an attribution of the origin of these deneholes to the period of Danish invasions need not necessarily imply more than that they were much used, or supposed to have been used, at that time, a tradition taking them back not merely to the time of the Roman occupation, but to the period preceding it, gives in itself a very strong presumption in favour of their British and pre-Roman origin. And the mediæval supposition that they were "gold mines" certainly shows that the purpose of their makers was then an unfathomed mystery, whether they were supposed to have been secret gold mines or secret hiding places for treasure.

With these natural inferences from the scanty documentary evidence at our disposal, the slight additional evidence obtained during our exploration is quite in harmony. For though the pieces of Niedermendig millstones are not necessarily Roman in date, yet these millstones were very largely imported by that people, and fragments of them are, as Mr. Rudler remarks, "found at most Roman stations in this country" (see Appendix II.). And the fragment of rude primitive British ware carries us back to pre-Roman times. Possibly exploration in some of the much less choked-up pits of the Bexley groups may some day reward the investigator with more precise evidence as to date than seems obtainable at Hangman's Wood, without the expenditure of an amount both of money and of labour much greater than can be fairly expected.

Little doubt, however, has usually been felt by people interested in deneholes as to their date, which has commonly been supposed to be either Roman or pre-Roman; much more discussion has arisen as to the purposes they were originally intended to serve. For that reason a brief account of modern chalk-wells and of ancient flint-works has just been given, in order that the reader may be made acquainted with their respective characteristics, and be able to compare them with deneholes as described in this Report, and illustrated by our plans and sections. Though all we have learned about deneholes would at least lead us to class them as *denholes* or secret hiding places of some kind, whatever difference of opinion might be entertained as to what was probably hidden or stored in them, opinions have yet been largely entertained that they were ancient chalk-wells or flint-workings, or even Roman sepulchral vaults. In the "Archæologia," vol. xxxiv., page 21, is an "Account of the Discovery of Roman and other Sepulchral Remains at the village of Stone, near Aylesbury, Buckinghamshire," by J. Y. Akerman, Esq., Secretary to the Society of Antiquaries, in which the writer gives a drawing of a *columbarium* or receptacle for the ashes of the dead after cremation, discovered at Rome in 1692. Admittance to this columbarium is given by means of a shaft 51 ft. deep, with footholes at the sides like those of our deneholes, at the bottom of which is a domelike vault with a corridor outside it. The chamber is stuccoed, and the niches for the *ollæ*, or cinerary urns, painted light blue, etc., etc. Mr. Akerman, after describing certain pits at Stone, the contents of which showed them to be of like character, and alluding to others more or less similar at Ewell and Richborough, states his belief that Royston cave was clearly a Roman sepulchral vault, and that the East Tilbury and Hangman's Wood pits are of Roman origin, and were used for the same sepulchral purposes. Now it cannot be said that there is anything in the position of Hangman's Wood geologically or topographically, or in the separation of each pit from its neighbour against this view. But it is evident that had these Hangman's Wood pits been columbaria the fact would have been evident from the existence of niches for the cinerary urns, and of some fragments at least of the cinerary urns themselves. Even if the latter had all been removed or destroyed, the niches must have remained, for, as we have seen, appearances are decidedly against the supposition that the pits have been perceptibly altered in shape since their original construction.

The Royston cave, on the other hand, is a dome-shaped chamber with numerous niches in its walls, which may well have been at one time a columbarium, whether originally constructed for that purpose or not. And we have some record of the finding of what seems to have been a Roman sepulchral vault in the immediate neighbourhood of Hangman's Wood. At a meeting of the Royal Archæological Institute in 1869, Mr. R. Meeson exhibited antiquities from Grays Thurrock, mentioning at the same time that in every field in that neighbourhood below which was a substratum of chalk, deep cavities known as daneholes existed, which he believed had been originally formed to obtain chalk for lime. He added that he had opened one of these pits, which he had found full of Roman burial





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By T. V. Holmes.

vases which had been crushed by the fall of the roof. The exact position of this pit is not given, nor have we any means of ascertaining whether it differed in shape or character from the other pits mentioned, or whether its structural affinities were rather with a columbarium, a Hangman's Wood denehole, or any other variety of excavation in chalk (Arch. Journ., vol. xxvi., page 191).

But, in any case, the evidence is decidedly against the view that the Hangman's Wood pits were columbaria. Against the supposition that they were ancient flint workings, we need only mention their position, with 60 ft. of sand and gravel above the flint-bearing chalk, the absence of any sign that the one prominent flint band in them had been specially worked, and the total want of flint flakes in the mounds.

The hypothesis that our Hangman's Wood deneholes are not *den*holes but ancient chalk pits, has arisen apparently from knowledge of the existence of modern chalk wells, coupled with ignorance of the nature of ancient deneholes. Indeed, before the last five or six years, Mr. Spurrell appears to have been the only scientific observer who ever gave any real attention to the latter and their characteristics. The documentary evidence supposed to tell in favour of the chalk-well view, consists simply of the following passage from Pliny, who speaks of the extraction of chalk "by means of pits sunk like wells, with narrow mouths, to the depth, sometimes, of one hundred feet, where they branch out like the veins of mines; and this kind is chiefly used in Britain."[9] It will be at once noticed that the above account could not have been given to Pliny by any man who had ever descended into one of our Hangman's Wood deneholes, which are entered by means of narrow shafts, but whose lofty symmetrical chambers cannot be described as "branching out like the veins of mines." On the other hand, the galleries at the bottom of the shafts at Grimes Graves might be described as "branching out like the veins of mines," but the shafts themselves were some twenty or thirty feet in diameter. Possibly Pliny's informant heard something of various kinds of pits in chalk, and "combined his information." But even had he shown unquestionable personal knowledge of the Hangman's Wood Pits, his views as to the purposes of their makers would not necessarily possess any value. For the chalk extracted from a pit made for the sake of the excavation, would be utilized as much as that removed from a pit made for the sake of the material extracted. And a foreigner accidentally discovering secret pits—and our surface trenches showed our deneholes to have been secret excavations—would almost necessarily be deceived as to their use by natives of whom he made enquiries. It seems therefore evident that the quotation from Pliny simply tends to demonstrate the existence of deep shafts in the chalk of Britain 1,800 years ago, and leaves the probable purposes of the makers of the Hangman's Wood, or any other pits, to be decided by the evidence of the pits themselves. Now, Mr. Bennett's enquiries about chalk-wells (see Appendix III.) have caused him to think them more modern than open chalk pits, "perhaps only dating," he remarks, "from the middle of the last century;" while Mr. Luke Lowsley, of Hampstead Norris, Berkshire—quoted by Mr. Bennett as an authority on the subject—states that the sinking of chalk-wells in that part of the country has occurred only during the last sixty or seventy years. And Mr. Bennett's experience of chalk-wells is, that they only exist where the chalk is not more than fifteen feet below the surface. Even if we admit that chalk-wells may possibly be more ancient than Mr. Bennett and Mr. Lowsley think them, and also allow that desire for chalk might account for shafts here and there where, as at Hangman's Wood, it is about sixty feet below the surface, and there is plenty of bare chalk within a mile—on what grounds can the concentration there of more than fifty shafts in six acres be explained? Then, why did not the Hangman's Wood excavators—if wanting chalk—drive galleries about seven feet high in various directions till the shafts communicated, instead of keeping each pit carefully separated from its neighbour, and obtaining more room, after reaching certain dimensions horizontally, by increasing the height of the chambers, and removing the partitions between them? Why was the position of mere pits for chalk so carefully kept secret, when the chalk hill-sides around Gravesend and Purfleet were as conspicuous as the river Thames itself? And how could narrow-shafted pits at Hangman's Wood have competed with chalk quarries close to the river in the chalk export trade? [10]

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[9] Pliny Nat. Hist. Lib. xvii. Cap. 8, Translated in Mr. C. Roach Smith's "Collectanea Antiqua," vol. vi., pp. 243—247.

An additional argument of weight against any application of the chalk-pit hypothesis to the Hangman's Wood or Bexley deneholes is furnished in Mr. Bennett's notes. As regards the non-permanent wells for chalking land, he points out that they owe their depth partly to a desire to obtain chalk free from the material in surface pipes, partly to an idea that chalk from a depth is preferable, as "stronger" in its effect as manure. With respect to the more permanent wells for obtaining chalk for lime, we learn that they are sunk deep in order to obtain stability as well as pure chalk, and also to get "lumpy" chalk with which to arch in the lime kilns. Strange to say, this existing preference for chalk from some depth has sometimes been quoted as though it told in favour of the chalk-pit hypothesis at Hangman's Wood. Of course, it does precisely the reverse. People at Grays who wanted chalk from some depth below its surface would naturally go where there was little or no superincumbent material, and there sink a shaft 30 to 60 ft. or more in depth. Mr. Bennett's diagram of a well for lime is, doubtless, a good example of the kind of pit that would have been made. There we see a shaft sunk through 15 ft. of Tertiaries and about 35 ft. of chalk before headings were driven, but Mr. Bennett remarks that where the chalk was bare the depth of a shaft sunk for a similar purpose, which he saw, was only about 30 ft. Therefore, at Hangman's Wood we ought to expect—on the chalk-pit hypothesis—to find the shaft penetrating the chalk from 25 to 30 ft. before the headings were driven. But instead, we find that the thickness of the chalk roof there averages rather less than 3 ft., and that not only has the stability of the pits suffered therefrom, but that a pipe has in one case entirely checked the development of a chamber. The absurdity of the chalk-pit hypothesis, as regards Hangman's Wood, might therefore be demonstrated from this one fact, that the excavators there, after sinking through 60 ft. of sand and gravel have then contented themselves with the very uppermost chalk. For the words of Lieut.-General Pitt-Rivers, uttered in the Pen-pits controversy, are equally applicable here. "The Britons, if such they were, who quarried here, probably conducted their operations much as we should do."[11]

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[10] It is worthy of note that Mr. Palin refers to the extensive works at Grays as being of "great age. The Registers speak of 'Smith, a Lym Burner,' buried here in 1691." See "Stifford and its neighbourhood," page 83.

All these considerations unite to make it evident that if the primary wish of the Hangman's Wood excavators was to obtain chalk, they knowingly and wilfully concentrated their efforts of every kind so as to ensure the least and worst possible return for their labour—a thing which no people, ancient or modern, ever did or will do.

Thus it seems evident that our deneholes were *den*holes, and could not have been pits for chalk, flint workings, or columbaria. On the other hand it is not easy to say with anything like certainty for what purpose they must have been mainly used, though on the whole, it seems most likely that they were intended to serve as granaries. In Mr. Spurrell's well-known paper [12] so indispensable to everyone interested in deneholes, the prevalence of underground granaries in almost every part of the world, and in all times, ancient and modern, is amply demonstrated, and Mr. Spurrell's paper on "Ensilage," forming Appendix V. to this Report, gives in a convenient form a vast amount of information on the subject. Great numbers are known to have existed in northern France, and in our own country they have been detected at Winklebury, and in the Isle of Portland, also in E. Norfolk.[13] The British examples were all very much smaller than our deneholes, either because the nature of the rock prevented more roomy excavations, or because the corn was not stored in the ear but as grain alone, or for some unknown reason. Representations of the Isle of Portland pits are here shown (Figs. 8 and 9) for the purpose of comparison, and particulars of somewhat similar pits in Oxfordshire are given by Mr. H. B. Woodward in Appendix IV. to this Report. In pits such as those at Hangman's Wood, corn was probably stored in the ear with much straw around it, both to aid in preserving the corn, and as itself fodder for cattle, and the lofty chambers were thus amply utilized. The abundance of corn in South-eastern Britain was noted by Pytheas in the middle of the fourth century, B.C.; and some two centuries later another Greek named Posidonius visited our island and is supposed to have been the authority of Diodorus Siculus for the statement that the people of Britain had mean habitations, made for the most part of rushes and sticks, and that their harvest consisted in cutting off the ears of corn and storing them in pits underground, some of the corn which had been longest stored being taken out each day for food (see Elton's "Origins of English History"). And when it is remembered that among the very few human relics found during our exploration were fragments of two millstones, it will be evident that the hypothesis that the Hangman's Wood deneholes were mainly used as secret storehouses for grain, furnishes perhaps the most probable explanation of their existence.

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[11] "Times," Sept. 25th, 1884.

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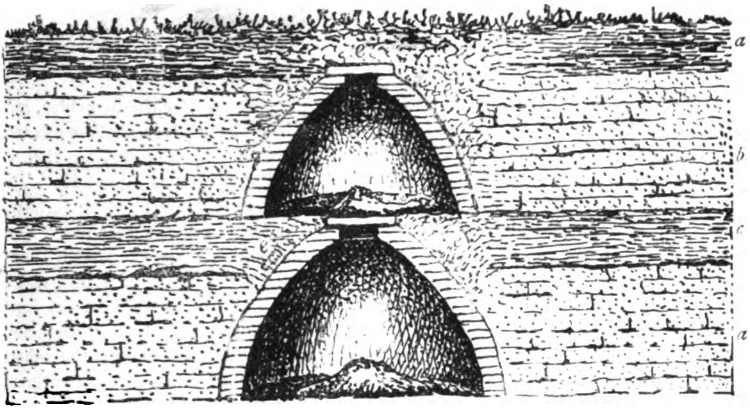
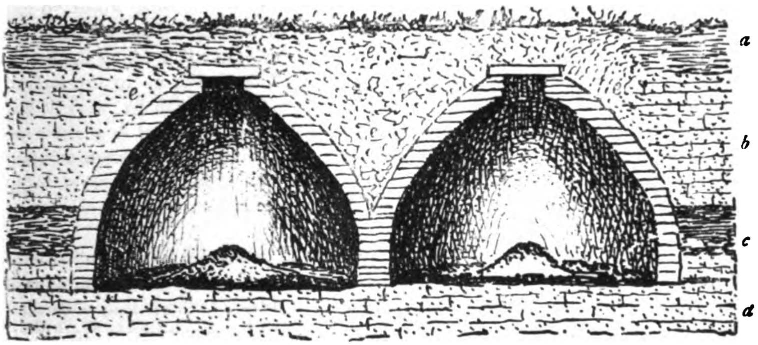
[12] "Archæological Journal," Nos. 152 and 153. Read April, 1881.

[13] See Trans. E.F.C. vol. v., pp. 108—9. Also Proc. Geol. Assoc., vol. viii, pp 404—10.





FIGS. 8 AND 9.– PITS IN THE ISLE OF PORTLAND. Reduced from Drawings by Mr. A. M. Wallis. Proc. Geol. Assoc., vol. viii., page 305.[14]

FIG. 8.—One pit above another.

FIG. 9.—Two pits close together with an opening between them—*a*, soil; *b*, rubble-stone; *c*, clayey seam; *d*, hard "slate;" *e*, rubble, with which the space close to the outside was filled after the construction of the pits.

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[14] These pits were described by Mr. Holmes in the papers in the Proc. Geol. Assoc. and Trans. E. F. C. referred to above. His attention was first called to them by Mr. A. M. Wallis, of the Isle of Portland. The pits hitherto discovered have been all situated a little eastward of the road between Yeales and Easton, towards the northern end of the island, and they were found by the quarrymen when removing some fifteen or twenty feet of Purbeck Beds at the surface in order to get at the Portland stone beneath "These beehive-shaped pits were all walled-in by pieces of the rubble-stone in which they are mainly excavated, and varied considerably in size. The largest chambers were seven or eight feet in height, and about nine feet in diameter at the bottom, the floor being eleven or twelve feet beneath the surface of the ground. The smallest chambers were only about four feet high, and six feet in diameter or thereabouts. The entrance to them was a narrow opening in the middle of the roof, just large enough to admit a man, and covered by a piece of hard flaggy stone, this stone being placed just below the vegetable soil, which is from one to two feet thick. In one of these holes a considerable amount of blackened corn was found, mixed with black earth, the latter probably marking the total decomposition of a much larger quantity. Three old querns have been found close by the beehive-shaped pits, about twelve or fourteen of the latter having been discovered." Mr. Holmes refers to the general resemblance between these Portland pits and the "Rock Granaries" of Southern India, described in G. P. Sanderson's "Thirteen Years among the Wild Beasts of India" (Lond., 1878).—ED.

ADDENDA.

(*A*) NOTES ON SOME CHALK-WELLS IN BUCKINGHAMSHIRE.

Mr. F. W. Elliott, an active member of the Essex Field Club, has called attention (ESSEX NAT. I., 224) to some shafts in chalk in Buckinghamshire, and has expressed his view that there is more affinity between modern chalk-wells and the Hangman's Wood deneholes than we admitted in our remarks, or than is apparent from Mr. Bennett's paper on "Chalk-wells" given as Appendix iii. to this Report. Mr. Elliott said that when staying in the neighbourhood of Burnham Beeches, Buckinghamshire, in 1884, he visited some tile-works near the "Yew Tree" inn, on the road to Beaconsfield, about midway between that town and Farnham Royal. The tile-yard was situated on the slope of a hill, which had been cut away to quarry soil for the purposes of the trade. In the level space thus formed were sunk five or six shafts, four to six feet in diameter, and lined with brick. Over one of the shafts a windlass was fixed; the others were deserted and overgrown with brambles, etc., but otherwise uncovered. The sound of falling water in some of the pits was audible. He could not get down any of the shafts, as the tackle had been removed when work had been suspended some weeks previously, in consequence of a sufficient stock of chalk having been accumulated. A workman said that each shaft was about 70 feet deep, and that it penetrated about two yards into the chalk, and then opened out into a single bell-shaped cavity, wherein one man worked at filling the bucket with chalk, and then swung it into the centre to be drawn up to the surface. When the cavity got to be inconveniently large for one man to work it was abandoned, and another shaft sunk. Mr. Elliott understood that in one or more instances water had come into the chamber, and forced the workmen to begin afresh. The chalk was, he understood, used for making lime, and was stated to be better than that to be obtained within two or three miles where it came close to the surface.

As compared with Mr. Bennett's examples (see Appendix IV.), the peculiarities of Mr. Elliott's pits consist in the thinness of the chalk roof, and in the concentration of five or six shafts in a small space. The bell-like expansion at the bottom of the shaft is common to both, and so is the width of the shaft. And as, according to Mr. Elliott, the nearest point at which bare, or almost bare, chalk is obtainable is about three miles away, a single shaft, or possibly even two, might naturally be expected at a tile-works so situated. That the depth was 70 feet, instead of the 60 feet of Mr. Bennett's lime-wells, is in no way noteworthy, inasmuch as while the sites of lime-wells for agricultural purposes depend largely on the depth of the chalk, those of tile-works are regulated by the position at the surface of the brick-earth or clay of which the tiles are made.

Thus these tile-works pits appear to resemble the deneholes of Hangman's Wood more than any of Mr. Bennett's chalk-wells in the concentration of the shafts and the thinness of the chalk roof. Mr. Elliott's remarks, however, furnish a perfect explanation of the cause of the differences between Mr. Bennett's pits and these Bucks ones on these two points. As already remarked, a shaft to the chalk is naturally to be expected at a tile-works where the bare chalk is three miles away, and must otherwise be bought from some quarry-owner, and carted from a distance. In this case, accordingly, a shaft was sunk, but the chalk being locally almost full of water, penetration to any depth was impossible, and hence only the uppermost chalk was worked. Even then the pit became unpleasantly wet before any great quantity of chalk could be extracted, and this naturally led to the abandonment of the first shaft and the sinking of another near—and so on. It is, therefore, evident that all that is exceptional in these tile-works pits—as compared with Mr. Bennett's examples—arises solely from the exceptionally waterlogged condition of the chalk in the locality, and gives us no ground whatever for supposing that the tile-works sinkers would not have penetrated the chalk as deeply as the Berkshire sinkers, had the circumstances been similar, or would not have contented themselves with one shaft had the chalk been dry. We have indeed in this instance a good example of the exception that proves the rule. Of course sinkers of chalk-wells for agricultural purposes would never, finding the chalk waterlogged, have sunk again close by, but the proprietors of tile-works usually have rights of sinking shafts only within a very limited area, and find no great inconvenience from the presence of disused shafts within that area.

(*B*) LIST OF SUBSCRIBERS TO THE "DENEHOLE EXPLORATION FUND."

The following gentlemen were, in 1884, appointed a Committee for the purpose of conducting investigations into the nature and use of the Deneholes existing in Essex and elsewhere:—T. V. Holmes. F.G.S., M.A.I. (*Chairman of the Committee*), Prof. G. S. Boulger, F.G.S., F.L.S., Herbert E. Brooks, B. G. Cole, W. Cole, E. A. Fitch, F.L.S., Prof. Flower, F.R.S., A. Lockyer, Prof. R. Meldola, F.R.S., N. F. Roberts, F.G.S., F. W. Rudler, F.G.S., Worthington G. Smith, F.L.S., F. C. J. Spurrell, F.G.S., C. Thomas, F.G.S., Henry Walker, F.G.S., A. R. Wallace, F.L.S., Rev. W. Linton Wilson, M.A. The actual work of exploration at Hangman's Wood was intrusted by the Committee to Messrs. T. V. Holmes and W. Cole, who were also requested to draw up the foregoing Report. It will, therefore, be understood that the reporters are alone responsible for the statements and conclusions appearing in the same. Under the authority of the Committee a fund was opened, and numerous contributions have been received or promised. By the kindness of Mr. F. W. Rudler and the Council of the Anthropological Institute, a circular calling attention to the proposed explorations was inserted in the Journal of the Institute. As one stage of the explorations is closed, it is thought well to acknowledge in the fullest way the kind aid so generously afforded by many members and friends. The list of subscriptions is therefore printed in this place:—

	£	s.	d.
Grant from the Council of the Lewisham and Blackheath Scientific Association	5	0	0
Prof. Boulger, F.L.S., F.G.S.	3	3	0
Prof. R. Meldola, F.R.S., F.R.A.S., M.A.I. ...	5	5	0
T. V. Holmes, F.G.S., M.A.I.	5	5	0
R. Letchford, F.R.M.S. ...	4	4	0
Henry Walker, F.G.S. ...	2	2	0
William White, F.E.S. ...	1	1	0
Dr. J. Drew, F.G.S. ...	1	0	0
F. C. J. Spurrell, F.G.S., M.A.I.	1	10	6
N. F. Robarts, F.G.S. ..	1	0	0
F.W.Rudler, F.G.S., M.A.I.	1	1	0
Charles Bird, F.G.S. ...	0	10	0
William Cole	1	1	0
Benjamin G. Cole	0	10	6
J. Guardia	0	5	0
Rev. S. S. Greatheed, M.A.	3	3	0
E. Provis	0	10	0
Dr. E. A. Snell	0	10	0
Dr. Hicks, F.R.S.... ...	0	10	0
John Owen...	0	10	0
Dr. J. Foulerton, F.G.S....	0	10	0
Col. Russell, D.L., J.P. ...	0	10	0
J. H. Porter	0	10	6
Alfred Tozer	2	2	0
Mrs. E. C. Robins ...	0	10	0
Walter Crouch, F.Z.S. ...	0	10	6
Andrew Johnson, D.L., J.P.	1	0	0
R. L. Barnes, F.C.S. ...	1	1	0
Ferdinand Grut, F.L.S. ...	0	10	6
J. J. Winder	0	10	0
Robert Nuttall (Junr.) ...	0	10	6
Edward A. Fitch, F.L.S....	1	1	0

	£	s.	d.
Professor Morris, M.A., F.G.S.	0	15	0
W. Thorp, F.C.S.	0	10	0
M. S. Davidson	1	1	0
T. Hay Wilson	0	10	6
Rev. F. de Q. Marsh	0	10	0
E. Wilkinson	0	5	0
H. H. Mason	1	1	0
J. Faulding	1	0	0
J. Love	0	10	0
W. White	0	10	0
Rev. H. C. Day	0	5	0
Ditto (Collected by)	0	7	6
Alfred Lockyer	0	10	6
Messrs. Wren & Gurney	1	1	0
Charles Thomas, F.G.S.	2	2	0
R. G. Fletcher	0	5	0
T. Fisher Unwin	0	10	6
George Biddell	1	1	0
Robert Miller Christy	1	0	0
Frederick Chancellor	2	2	0
W. Boreham, J.P., F.R.A.S.	0	10	0
P. W. Wall, F.G.S.	0	10	6
E. T. Newton, F.G.S.	0	10	0
George Weller, M.R.C.S.	0	10	6
J. C. Shenstone, F.R.M.S.	0	10	6
The Sidcup Literary and Scientific Society, per W. Law Bros.	2	2	0
R. W. Christy	0	10	0
M. Lindsay Phillips	0	10	6
Henry J. Barnes	3	3	0
Rev. C. S. Dewick, M.A., F.G.S.	4	4	0
C. J. Leaf, F.L.S., F C.S.	3	3	0
Mrs. Grant Smith	3	3	0
Mrs. Lowther	1	1	0
Henry Stear, M.R.C.S.	0	10	6
M. Hawkins Johnson, F.G.S.	0	2	6
Grant from Society of Antiquaries	5	0	0
J. W. Holmes	0	5	0
Miss E. Graham	0	5	0
Mrs. T. V. Holmes	1	0	0
Miss Holmes	0	5	0
W. E. Bovill	1	0	0
B. Winstone, M.A.	2	2	0

The reporters have pleasure in returning thanks to Mr. Biddell (agent to the owner) for full permission to work in the Wood; to Mr. H. A. Cole, Mr. R. M. Christy, and Mr. B. G. Cole for valuable assistance afforded during our work; to Mr. Vellecott for kind offer of storage for tackle, etc., in his barns; to Messrs. Brooks, Shoobridge and Co. for loan of tackle and other assistance; and to Mr. Shipman, contractor, of Grays, who acted as a kind of foreman, etc. Also to Mr. Franks and Mr. Read, of the British Museum, and Mr. E. T. Newton and Mr. Rudler, of the Museum of Practical Geology, for kind assistance in determining the age and character of the various objects found during our exploration. They have also to acknowledge the kind efforts of Mr. W. Greatheed to photograph the interiors of some of the Deneholes; the pictures were more successful than any before taken.

(*C*) EXPLANATION OF THE PLATES.

Plate III.—Map of Hangman's Wood, based upon portions of the Ordnance maps (scale 25 inches to the mile, nearly equivalent to one square inch to an acre) of the parishes of Orsett and Little Thurrock. The map shows the positions of all the principal deneholes in the Wood, distinguishing those pits now open, and denoting by numbers those which have been entered during the explorations.

Plate IV.—Ground plan of the pits which were explored or visited, showing the galleries (*red*) made in opening them up, and also showing by the patches of *blue* tint the portions of the floors which were exposed by the removal of the heaps of sand and *debris*. The numbers are the same as those used to denote the visited pits on Plate III. No. 1 pit is not shown, inasmuch as from its shattered condition it was not considered advisable to connect it with the others. The plate also exhibits a section of No. 5 pit, showing the strata through which the shaft passes. The interior of this pit, during the explorations, is given in fig. 5 on page 239 *ante*.

Plate V.—Geological sketch maps of the neighbourhood of Hangman's Wood and Bexley in Kent, showing the surface occupied by bare chalk (*blue*) as compared with that covered by the overlying beds (*brown*), and also showing the positions occupied in the latter by the deneholes. In each case the excavators have chosen to sink the pits through some forty to sixty feet of overlying beds to reach the chalk, though there is in both localities a broad expanse of bare chalk within a mile of the sites of the deneholes.

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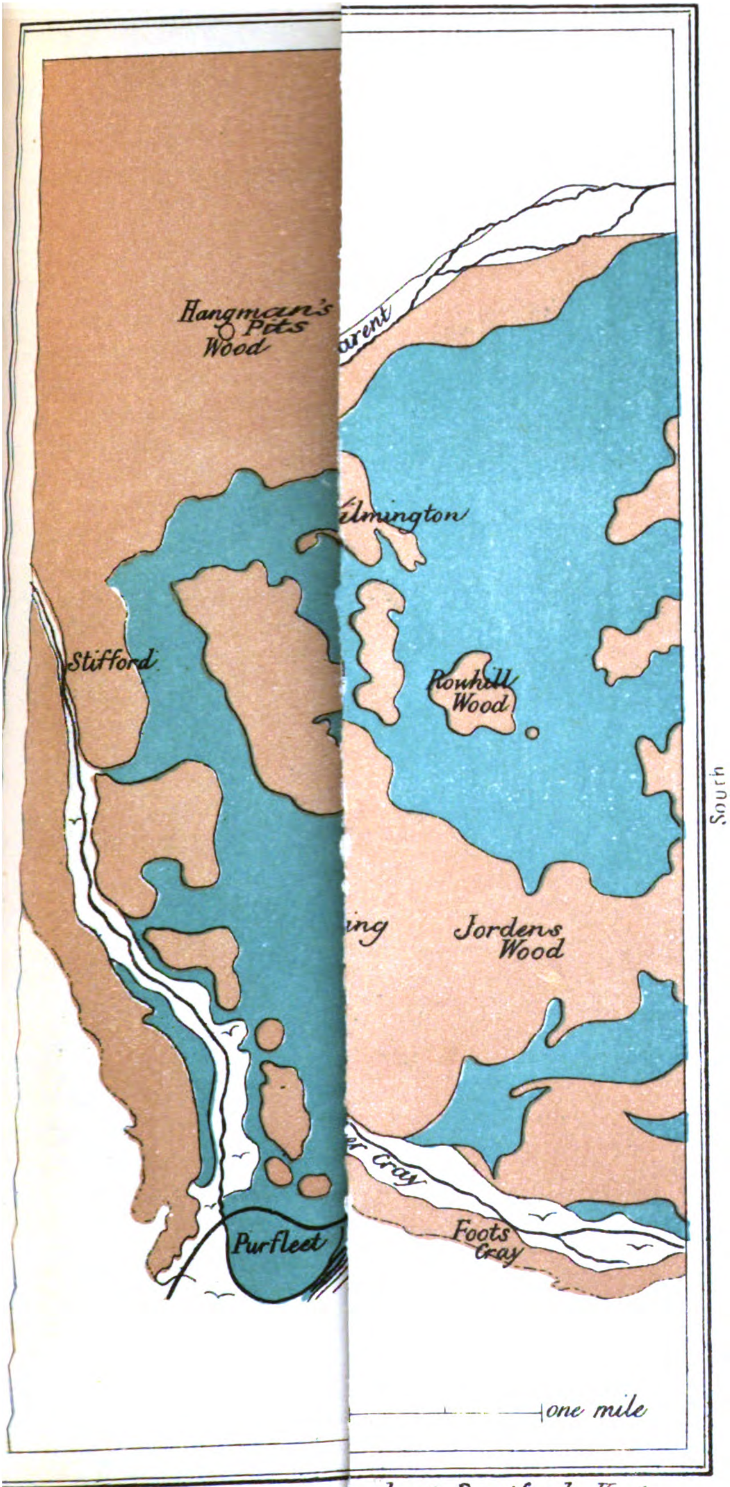

Maps to show the areas exley & Dartford, Kent.

APPENDICES.

I.—NOTE ON THE BONES FOUND IN THE DENEHOLES IN HANGMAN'S WOOD.

By E. T. NEWTON, F.G.S., F.Z.S., of the Geological Survey.

THROUGH the kindness of Mr. Holmes and Mr. Cole I have had the satisfaction of visiting the deneholes at Hangman's Wood during the explorations, and of examining not only several of these interesting excavations, but also of seeing many of the places from which the numerous bones of animals were obtained. In two or three instances, under the guidance of Mr. Holmes and Mr. Christy, I went into chambers which had been entirely closed, and saw them in the condition in which they were when first opened. It was very curious to find the bones of a number of different animals at the extreme edge of the pile of sand, which had by degrees fallen down the shaft until the latter was at length closed. At first it seemed strange that the bones should be almost always at the outer edge of this pile, but the reason was soon obvious. The sides of these piles of sand are very steep, and it would mostly happen that any animal falling down the shaft would sooner or later slide to the lowest part. Even if the animal were not killed by the fall, yet, as it became weaker through want of food, it would become less able to climb the steep sides of the heap, and would at length lie down to die at the lowest part. Before the accumulation of the sand-heap any animal falling down might remain on the floor directly beneath the shaft, or, if not killed, might get away from the shaft, but would eventually leave its remains upon the floor in some part of the chambers, to be at length covered over by the increasing pile of sand. As the sand-heap increased in size, there would be a tendency for whatever fell down upon it to slide further and further away from the shaft. It thus happens that the bones of animals are found chiefly near the floor, and when the chambers are first opened the bones are to be found mostly around the edges of the sand-heap.

Among the numerous bones which have been collected by the explorers I have been able to identify the following: human bones, with those of horse, ox, sheep, pig, goat, dog, fox, cat, badger, polecat, weasel, rabbit, hare, indications of one or two birds, and parts of a toad. The circumstances relating to the finding of the human bones have been referred to by Mr. Holmes; and as it seems evident that eighty years ago the skeleton was on or near the surface of the pile of sand beneath the shaft, it was therefore of later date than the pile of sand. The bones themselves do not exhibit any peculiarities which would serve to distinguish them from those of an ordinary European. The femur is of moderate size, but too much broken to allow measurements being made; and the tibia does not present the flattening which has been noticed in certain ancient skeletons. The equine remains are of two sizes, and the smaller may possibly have belonged to a donkey. There is no reason for supposing that the ox bones are other than those of the domestic ox; the only skull found is very imperfect, and the limb bones do not seem to be small enough for the *Bos longifrons*. The bones of two or three sheep have been obtained, and these indicate rather small, although adult, animals. One skeleton nearly perfect had well developed horns. The bones of dogs are very numerous and vary much in size. As it is by no means uncommon for dogs to fall down these shafts nowadays, one is not surprised that in times gone by they were frequent victims of these excellent though dangerous "pitfalls." The bones of rabbits, as might be expected, are more numerous than those of any other animal. All the species which have yet been found in the deneholes are such as now inhabit the neighbourhood, and therefore give no indication of the age of these remarkable excavations.

It is somewhat strange that up to the present time the deneholes have yielded no remains which indicate any great antiquity; indeed, all those characteristic forms which are usually met with in prehistoric deposits are conspicuous by their absence. Even if the *Bos primigenius*, Irish elk, and reindeer, were extinct in this region before the deneholes were made (or at least before they were abandoned) one would expect to find the remains of brown bear, wolf, *Bos longifrons*, roe deer, or red deer. The wolf, we know, existed in some abundance in this country at the time of the Norman Conquest, and was not exterminated for some two or three centuries afterwards. It is just possible that some of the canine remains which have been found may belong to wolves, but we have no definite evidence that such is the case. The *Bos longifrons*, red deer and roe deer are very generally found associated with Roman remains, but not even these have yet been found. The brown bear certainly lingered on in this country into the historic period, and one would expect to find his remains in some of these "pitfalls" if it still existed in the neighbourhood at the time when the deneholes were vacated. Negative evidence is always unsatisfactory, and we must hope that something more definite will yet be found in these or like pits. Mr. Holmes has mentioned the scratchings which covers the lower part of the walls of some of the deneholes, and he is doubtless correct in supposing them to have been made by imprisoned dogs in their endeavours to find a way of escape. There are also some extremely fine irregular grooves covering, like a delicate network, a large portion of some of the higher and more inaccessible parts of the walls, the cause of which was not at first evident; but when it was remembered that the open "holes" were inhabited by bats, it seemed extremely probable that these fine lines were caused by the delicate claws of the bats, as they fluttered against the walls, endeavouring to find a projection where they might alight and hang themselves up, or from which they might creep into the chinks of the rock to rest.

[The open-shafted deneholes appeared to be very favourite resorts of bats, notwithstanding the fact that the animals had to descend 50 or 60 feet to reach the chambers, where we often dislodged them from their temporary hybernacula. At a meeting of the Club on November 29th, 1884, Mr. Miller Christy exhibited the skins of five species of bats found in the deneholes during the first series of explorations. Three of the species were common Essex bats, viz., *Scotophilus pipistrellus*, *Vespertilio natteri*, and *Plecotus auritus*. Two species were rarer—*Vespertilio daubentonii* and *V. mystacinus*. The former appears to be rare in most places, but three or four specimens were captured by Mr. Christy during our underground labours.—Ed.]

II.—Note on the Fragment of Millstone from a Denehole.

By F. W. RUDLER, F.G.S., Sec. Anthropological Institute.

The fragment of millstone[16] found in one of the deneholes is no doubt derived from the "millstone lava," which, for the last two thousand years, has been worked in the neighbourhood of the Laacher See, in the Eifel. About three miles to the south of this well-known lake are the extensive subterranean workings of Niedermendig, which have yielded vast quantities of the millstone-rock. There exists in the neighbourhood a large number of funnel-shaped pits leading to spacious caverns, from which the stone has been removed, and as these deserted workings enjoy a low and equable temperature throughout the year, they are used as cellars for the famous Mendig beer. The rock may be described as a *Nepheline basalt*, and is remarkable for containing crystals of various minerals, notably haüyne, zircon, and leucite. The haüyne, which is perhaps the most common enclosure, is easily detected by its blue colour, and often enables a mere fragment of the rock, though found in some distant locality, to be readily identified. The vesicular texture of this old lava led long ago to its employment as a millstone, the worn surface always maintaining the roughness needed for triturating grain. The quarries are about eight miles distant from the picturesque town of Andernach on the Rhine, the old Roman station of *Antonacum*, near the spot where Cæsar constructed his wooden bridge across the river. In and around Andernach the lava is everywhere used as a building stone, but this application of the material seems to be only local. The quern, or hand-mill (*mola manuaria*), formed of this Rhenish rock was carried by the Romans wherever they settled, and fragments are found at most Roman stations in this country. It would, however, be rash to assign any discovery to the Roman period on the mere evidence of these millstones, for there can be little doubt that they found their way into England at very various dates. They were formerly imported in large numbers under the name of "Dutch Blues," having been sent down the Rhine to Holland, and thence to this country. Although largely superseded by the French burr-stones, it is probable that they are still used here to a limited extent. It seems, therefore, unsafe to base on the discovery of this fragment of millstone any conclusion as to the age at which the Essex deneholes were used.

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[16] Two still smaller fragments of this stone were found during the examination of the cone of sand, etc., in No. 5 pit. See *ante*.—Ed.

III.—On Chalk Wells.

By F. J. BENNETT, F.G.S., of the Geological Survey of England and Wales.

[*Read November 12th*, 1887.]

The practice of raising marl or chalk, and of putting it on land as a top-dressing, must go back to very early times, and may be prehistoric.

In Norfolk, to take a district with which I am familiar, pits were sunk in the Boulder clay, locally called "marl," from its containing so much chalk; this was especially beneficial in those parts where the Boulder clay is masked by a covering of sand. This process has been discontinued for many years, and much of the land that used to be so dressed has now lapsed into a barren and sterile state, and the very existence of the Boulder clay below the sand has been forgotten.

Chalk for this purpose is obtained in two ways; first, by open pits, secondly, by chalk wells.

1st. Open Pits.—This way, a very ancient one, is still used in many parts of Berks, and open pits are even used together with chalk wells, in the same field. Chalk pits are sunk some six feet, if used in conjunction with wells, but are much deeper if the supply is entirely obtained from them. I am told that chalk pits are the practice round Lambourne and Hungerford, and in many of the fields in the latter place these pits are to be seen. The position and number of the pits and wells is entirely regulated by the size of the field to be chalked.

2nd. Chalk Wells.—This method would seem to be the more modern one, perhaps only dating from the middle of the last century; but so far I have not been able to ascertain its exact age. Mr. Luke Lowsley, of Hampstead Norris (Berkshire) tells me that it has only been known in that neighbourhood during the last sixty or seventy years.

The depth of the wells varies from 15 to 40 ft. If the chalk be very near the surface, then 15 to 20 ft. would be the depth, but where the chalk is covered by, say 15 ft. of Tertiaries (and where the Tertiaries are thicker it does not seem to pay to sink the wells), then they would be from 30 to 40 ft. The greatest thickness of Tertiaries sunk through that I know of is 15 ft., viz., at Snelsmore Farm, three miles north of Newbury, and half a mile north of Arlington Manor. The section given me by the well sinker was, "Sand, then clay, then dark sand." Bare chalk is to be found on the same occupation, about one-sixth of a mile distant, but would have to be carted that distance uphill, thus making it cheaper to sink the shaft on the spot.

Chalking, as far as I have seen, is only resorted to where the chalk is covered by a sand, clay or gravel soil. I have never seen chalking done on the Lower Chalk, because the Lower and Middle Chalk are generally bare of soil in the tract of country under consideration, forming Downs; and the Tertiaries and the wash from them, with the Clay-with-flints—the soils usually chalked—are rarely, if ever, found away from the Upper Chalk.

Method of Sinking Chalk Wells.—Where the chalk is near the surface, as is the case where it is merely covered by the Clay-with-Flints, etc., the depth of the well rarely exceeds 15 to 20 ft.—as before remarked—the diameter of the shaft being 4 ft. 6 in. Clay-with-flints, however, occurs very irregularly over the chalk, sometimes in deep pipes or "bags," as they are locally termed, and sometimes only as a mere skin. Hence the term "thin-skinned" soils. Trial holes are dug, and the wells sunk, as far as possible, at the spots where the chalk is only just covered (see Fig. 10). When the required depth has been reached, what is termed "angling" commences, *i.e.*, headings are

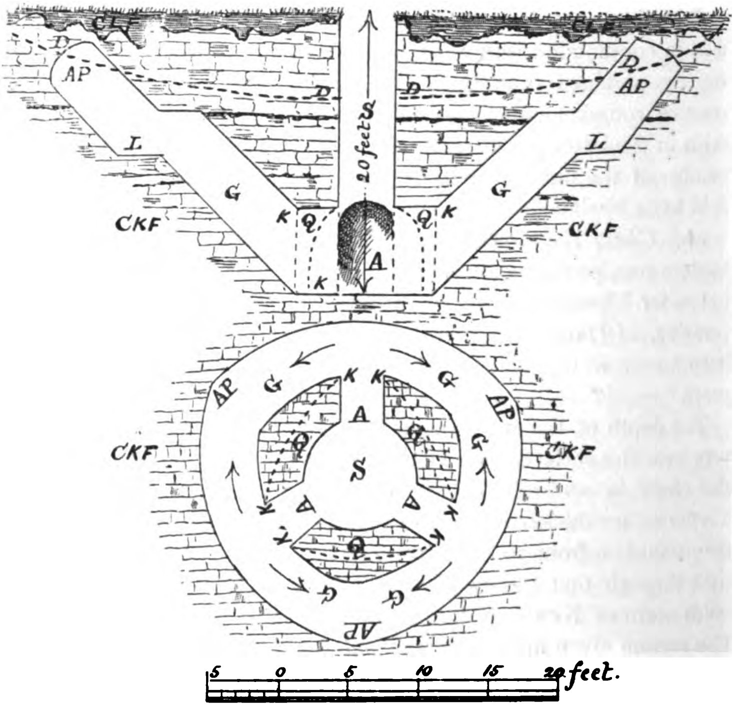

FIG. 10.—SECTION AND PLAN OF CHALK-WELL, SEEN AND MEASURED AT SEVENACRES, THREE-AND-A-HALF MILES N. OF NEWBURY.—C L F, clay with flints; C K F, chalk with flints; A P, point where galleries meet; G, gallery; Q, quoins or piers; A, angles; K, part of quoins cut away; L, landing; D, dell; S, shaft. Shaft 20 ft. deep. At the bottom, three "angles" (A) were driven, each being about 3 ft. wide and 9 ft. long. The men then worked right and left, each man ascending as steep a slope as he could work on for perhaps 7 ft. Then a short level was formed, and after that upward work was resumed till the headings were united, a circular gallery being thus formed, communicating with the shaft by means of the headings. When all the chalk required has been extracted, the quoins (Q) will be cut away as far as safety will allow, and the workings will fall in after a time, forming a dell or slight hollow at the surface.—From a drawing by F. J. Bennett and H. A. Cole.

driven. These are level at first, but after a few yards they incline up towards the surface, which they almost reach, thus forming an inclined plane for the chalk hewn to run down into the boxes under the shaft. Ladders are, I am told, sometimes used by the men to ascend the "angles." As many as three, and sometimes four of these angles are driven. After all the chalk wanted has been extracted, parts of the "quoins," or divisions between the headings are usually knocked away, though this is sometimes neglected. This causes the well to fall in, forming a "dell" or hollow at the surface of the ground, and in most cases obliterating all traces of the workings; though this would vary, I should imagine, with the character of the chalk. The aim is to cause a dell so even and shallow as not to interfere with the plough. But while a dell, resulting from a shallow surface pit, would usually involve the removal of a large quantity of sand, clay-with-flints, etc., as well as chalk, the material removed from a chalk-well would be almost entirely pure chalk.

One other view may govern the depth of the chalk-well, and that is the idea that chalk from a depth is preferable, as being "stronger." I gathered that this meant that its effect as manure was more lasting.

A chalk-well 20 ft. deep, and with three angles, will dress eight acres. The amount put on is 800 bushels to the acre, and the cost from 30s. to 32s. per acre. The boxes used for hauling up the chalk hold two bushels.

Distribution of Chalk Wells.—A certain regularity in the distribution of the chalk-wells arises from the fact that wells of equal depths dress a corresponding area of land, and that if a regular amount be taken from each well, their distances apart would tend to be regular, as regards those on the same occupation. Chalk-wells are in general use to the N., N.E. and W. of Newbury, in the tracts of the Upper Chalk, or where the Tertiary beds are thin. Mr. H. B. Woodward informs me that shafts in chalk for chalking are also sunk in the southern parts of Buckinghamshire.

Chalk Wells for Lime.—Wells sunk for extracting chalk and burning it into lime are carried out in rather a different way from those for chalking land. They are often sunk to a depth of 60 ft. in the Chalk-with-flints, and then headings are driven at the bottom of the shaft. These extend some way in, and only very slightly slope up from the shaft (see Fig. 11). When all the chalk wanted for the time has been extracted, they are sometimes bricked over at the top for safety.

I will quote from a letter from Luke Lowsley, Esq., of the Manor House, Hampstead Norris. He says:—"The chalk-wells for kilns are sunk deep enough in the chalk to stand, the headings are started from the bottom of the shaft in all directions, about three, with the quoins very narrow at the shaft, but the headings are driven straight, increasing in width and height as they go, and the bottom of the shaft or mouth of the 'angle' is the lowest point. They are generally about 6 ft. wide, 8 ft. high, arched, and I never knew one angle under another (*i.e.*, I suppose that all the angles start at the same level from the bottom of the shaft, F. J. B.), as another shaft would be less expensive. I have often known cross angles, about 10 ft. in from one heading to another. When used up another is made near, and the digging from the new pit is used to fill up the mouth of the old one."

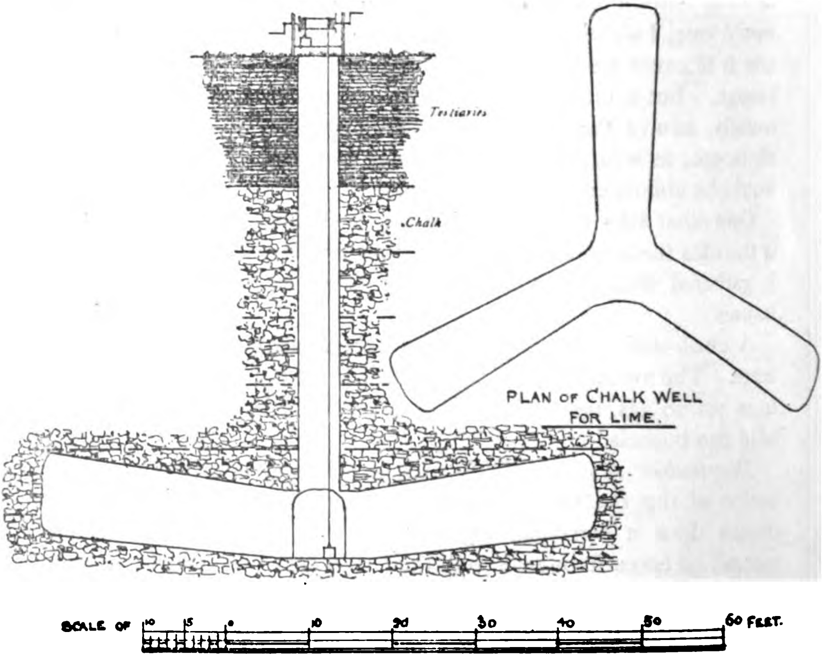

FIG. 11.—SECTION AND PLAN OF CHALK-WELL FOR LIME.—From a drawing by F. J. Bennett.

I have measured two such wells; one was near Hampstead Norris, the other at Basildon, and each of them was 60 ft. deep. In both instances there were about 15 ft. of Tertiaries above the chalk. In a third case the chalk was bare and the depth only 30 ft.

Chalk-angles Copse is half a mile S.W. of the "Axe and Compass," P. H., Burnt Hill Common, Yattenden. In this copse a large pit was sunk several years ago, about 20 ft. deep, and headings were driven in for extracting chalk for lime. Chalk for the land was also taken out, but the plan used was rather different from that usually adopted. It was as follows:—After the heading had been driven some way in, a shaft was sunk from the surface through the roof of the heading, and then the chalk was wound up the shaft. My information was obtained from a man who had worked in this pit. A shaft through the roof of one of the headings is still to be seen, and this attracted my attention and led me to question the man as to its purpose. He informed me that the chalk from the pit, which is in the Upper Chalk, is of very superior quality for lime and also for the land, the frost acting most readily upon it, and soon reducing very large pieces of it into minute fragments, small enough to mingle easily with the soil.

IV.—NOTE ON SOME PITS NEAR CHIPPING NORTON, OXFORDSHIRE.

By H. B. WOODWARD, F.G.S., Geological Survey.

DURING a fortnight's stay at Chipping Norton, my attention was drawn by Mr. James Windoes to the occurrence of chipped-flint arrowheads, scrapers, etc., on the high grounds between that town and the valley of the Evenlode on the south. He also informed me of the discovery of "pre-historic dwellings." It did not come within my programme to devote any special attention to these matters, but when examining the Oolites on Chadlington Downs, I noticed traces of two old excavations in the large quarry south-west of Chadlington Downs Farm, and just north-west of the Cross roads, one and a-half miles south of the church at Chipping Norton. These excavations were in a bee-hive form, five feet deep from the surface, about four feet in diameter at the base, and three feet at the surface. The holes had presumably a circular plan, but owing to their having been at least half worked away during the quarry operations, one could only judge by the remains left. The holes had been made in the brashy soil and rubbly oolite, their base being the more solid (unbroken) stone that occurred in layers beneath. This stone forms the uppermost division of the Inferior Oolite in the neighbourhood, and is known as the Chipping Norton Limestone; it is of variable texture, often falsebedded, and may be described as a hard, sandy oolite limestone, sometimes passing into a hard calcareous sandstone. The holes, though much smaller than those at Portland, described by Mr. Holmes (see *ante* page 252), and also figured by Mr. Damon (Geol., Weymouth, etc., Ed. 2, 1884, page 165), showed no signs of having been walled in. Numerous pieces of burnt limestone occurred, but I saw no other traces of human occupation.

[The following details of the contents of the pits on Chadlington Downs were given to Mr. H. B. Woodward, by Mr. James Windoes, of Chipping Norton, who for forty years has worked at the Geology of Oxfordshire, and who has a large collection of fossils, coins and other objects of interest:—

"The most southern hole was discovered about three years ago, and was opened and explored by Lord Ducie, upon whose estate it is. It contained portions of two human skulls—the cranium only. I have seen one of these, it appeared to me to be of rather a high type. I did not hear that any other human remains (bones) were found, but there were many bones and teeth of animals, and many fragments of black pottery, but not a fragment of flint or metal. The second hole was discovered in the early part of this year, and was immediately walled up till Lord Ducie had time to explore it, which he did in August last. It contained no human remains, but lots of bones and teeth of animals, and fragments of pottery, black, red and brown, perhaps of three periods. The black is loosely compacted, sun-dried, or at any rate only partially burnt; much of it in a wet-biscuit state; the red and brown is solid, compact, and well burnt, but without ornamentation of any sort. Most of the large bones were broken, apparently for the extraction of the marrow. One bit of flint was found, with many red quartzose pebbles and pieces of burnt wood. It is a curious thing that though the stones round the sides of the pits are all burnt red, there is no trace of smoke. None of the upper stones are blackened."]

V.—Ensilage, or Preserving Grain in Pits.

By F. C. J. SPURRELL, F.G.S.

The excavation of hollows in the soil for the purpose of hiding stores, whether in great *Silos* or in little *Câches*, is a common practice over the whole world. For the storing of grain, it is a method of the greatest antiquity, in full exercise to the present time; and it is universal, if the areas where the habit now prevails be considered together with those in which it formerly obtained. The simplest form of a silo is a hollow scraped in the ground for holding the objects to be hidden. The trappers of America call them "*Câches*," but equivalent words are found in every language from pole to pole. To "hoard" in English is essentially to conceal, a habit belonging to a period when the winter's provisions were buried out of sight of thieving neighbours, and hidden from marauders whose delight was not to acquire, but to destroy all they could see above the soil, such as houses, ricks or barns. Without going further afield than need be, it is proposed to give a sketch of the use and history of the silo in those countries which are nearest to Britain, but it is impossible to avoid appealing for illustration in such an enquiry to the customs of distant countries when the connection between them consists in insensible variation in the modes adopted; the transportation of the custom by a migrating people; or the comparison of instances, under similar circumstances of climate, soils, and racial peculiarities.

It is unfortunate that there is no circumstantial account left of the hoarding of grain in pits or "burys," either in this country or in Europe, in early times. It might appear that in Britain the habit of burying provisions deep in the soil, and especially in large quantities, was abandoned before the written description of agricultural methods came into fashion; but that is not quite the case, inasmuch as the earliest writers on agriculture were monks and students of latinity, who loved to describe the store places advocated by Vitruvius and such elegant authors, but who wilfully omitted to mention the humble "burys" of the poor provincials.

The modern grain pit of Central Asia is a hole in the ground with a narrow orifice. Taken generally, the mouth or opening is just wide enough to let a man pass, and not too wide to admit of being well secured by cross stakes or boards, so that when the sods are replaced nothing can be seen above, and the plough can pass over the pit. In the uncertain movements of those nomads who do not wander all the year, and few do that, the habit of those who cultivate grain is to sow it in spring, and leave it to grow unattended. Returning to harvest, they store in pits sufficient grain for winter use and for sowing next season, selling the rest; and when the winter snows come they live in the neighbourhood of the grain pit, with the certainty that they will find it safe until the spring comes again. They take care for the safety of the pit by covering it over and planting the corn above. Indeed, the store is often more in danger of being lost by the owner than found by the robber. In the case of those who live in a degree of greater security, the *silo* is more carefully prepared, that it may contain that extra quantity required by possible bad seasons. With the necessity of longer keeping, more suitable spots of dry soil are selected than the damp field in which the corn grew. Several families living near each other have their hoards close together, partly for convenience in finding them, and partly to prevent mutual robbery, a difficult feat where all eyes would be watching.

The size of these grain pits varies considerably. It is plain that a very small hole comparatively would be sufficient for one family, while many small, or one large pit, would be required by the man whose needs were greater or whose aim was wealth.

Again, the burying just beneath the surface in the damp field is a sadly hasty and risky mode of preservation, and one which it is clear would be used only by the more wretched peoples. The effort to keep out the damp is a constant trouble. It is accomplished in a measure by beating hard the sides of the pit if of clay; by enveloping the deposit of corn with straw, reeds, fern, or bavins; by endeavouring to harden the sides by burning with fire, which could only be done in very shallow pits; by erecting wooden walls and floors; by covering with mastic or cement; and, finally, by building the interior either with stones, finished masonry, or with bricks and *terra cotta*. All these modes are practised in Europe, and the improvement accords largely with the civilization of the country. The more modern improvements proposed, though retaining the name "Ensilage," are, however, such as to do away with the meaning of the word in its simplicity. Where the more primitive form of hoarding grain is in vogue, there are no stacks or ricks in the open, although the use of barns and warehouses in towns is concurrent with pits in the country. The reason is obvious. Ricks are exposed to many dangers, and, from their size, are guides to the robber; but the pit is secret, sure, and as free from vermin as from men.[16]

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[16] It is impossible that any but small and shallow depressions can be formed in light and alluvial soils; so shallow are these sometimes that the pit is only partially subterranean, while in the opposite case the same effect may happen when the soil is hard rock, difficult to penetrate. Rocks which are easily broken, as a rule, make good grain pits; but where the rock is very hard and much severed by joints, the site is unsuitable from the impossibility of controlling the flow of water. Limestones of various kinds are the most favourable of rocks to excavate, and those which are easily broken, and porous, not crystallized in their texture, best of all. The chalky limestones of the East and of Africa, soft tufa, and the chalk of Western Europe, are perhaps the most suitable. Unless below the permanent drainage line, no water stands in pits sunk in such strata, however damp they may be; and chalk will hold tenaciously an amount of water equal to its own weight, without showing any moisture on its surface, and the formation of caves with domed roofs is attended with greater permanence in limestones than in hardened sands.

As a rule too, loose sand, unless very consolidated, while making very good vertical sections for the sides and shafts of caverns, is unsuited to horizontal spaces of considerable area and especially to the rapid widening out which is seen in the caves in the chalk. The tertiary strata which cover the Chalk of Western Europe, make very unstable roofs, and in the case of the

Grain pits or silos are common in Europe now, and abound in all countries which border the Mediterranean and Black Seas, including Sicily, Malta, and the Islands generally. These countries have retained the usage from times earlier than history reports. Wheat millet, maize, rice, and other corn are alike stored in pits, while beans occasionally are so buried. Wine and oil have an equal share of subterranean hoarding, the silo in the latter case being generally of the better sort.

Spain in particular, as being the country nearest to Britain where the silo is in full use, is worthy of our first notice.

In the troublous times of the first French Revolution, and the wars of the first Napoleon, the storing of grain had become a matter of very serious consideration in all towns, especially when ricks and stacks were found more dangerous than useful; and men began to look about for safe and suitable modes of preserving grain for long and indefinite periods as well as short ones. M. Jourdain, finding the subject in agitation, brought his experience in Spain to the assistance of the State, and was the first to call the attention of the public in France to this mode of storing grain beneath the soil. He appears to have written several accounts, but in 1815 he minutely described the how, why, when, and where of the whole practice of "*Ensilage des Grains*," a word which was first employed by a translation of the Spanish phrase. The word *silo* is Spanish, and M. Jourdain also created the words *ensiler* and *desensiler*.[17]

M. Jourdain's paper is exceedingly useful for the minuteness with which he describes every detail, and by the addition of a long catechism of questions and answers, with a descriptive plate; a method which, while it tells us that the use of silos had gone out of fashion, was also the surest mode of teaching the whole matter to those amongst whom it was desired to re-introduce it.

M. Le Comte de Lasteyrie also called public attention to the storing of grain beneath the soil, and in sundry publications he not only propounded a modification of a silo suitable to the wants of the day, but he based its recommendation on the success of a custom,

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Thanet Sand, it is impossible to dig it beneath the surface, so that a roof may be achieved and a permanent cave formed. Consequently all such strata must be perforated until the more manageable chalk is reached. When there is a layer of tufa, as in Northern France, or other hard material, as in the remarkable layer covering the surface in parts of Morocco, excavation is easy, and shafts are rendered unnecessary. By far the larger number of grain pits are sunk without distinct shafts. Thus the use of shafts is a matter of geological conditions only, and they are, if anything, detrimental to the digging of deep caves for the purpose of holding grain, inasmuch as the difficulty of construction and access is greatly increased. It may be suggested that when a suitable rock was reached by a deep shaft, it was found of great advantage to dig a very large cave beneath one shaft, rather than to dig many small caves, each with a single shaft.

[17] The word *silo* is from the Greek *siros*, and the equally Spanish word *sitia* is also Greek.

most ancient and wide-spread, in an admirable historical introduction to his proposal.

M. L. Doyère, following these able writers after a long period, published in 1862 an account of a regular investigation he had just concluded into the silos of certain parts of Spain. He also advocated an improvement of his own in his *brochure*, "Ensilage des Grains."

The latest improvement was that suggested by M. Louvel in 1867, who proposed to place the corn in iron receivers, and exhaust the air.

In Spain, then, the silo is common. It is there an excavation which generally has the form of an egg or *carafe*, *i.e.*, a water jug. The orifice is circular, and of the size which just admits a man. The silo enlarges downwards from the surface, sometimes with a few feet of shaft, to about three quarters of the total depth, which is the widest part, while others widen into vaults. Sometimes a circle of brick (occasionally there is more masonry) is put round the mouth, which is closed with a flat stone or piece of wood, and a little heap of soil is raised over all to throw off the rain. Occasionally sheds are erected over the pits. Silos are usually placed on elevated ground. The soil selected is generally in compact clay or hardened sand. M. Jourdain recommends pits in "earth" *(terre)* as preferable from its purifying or disinfecting properties.

While single silos are common, it is the custom to accumulate them in hundreds, and even thousands, in or about cities, when a suitable bed has been found to dig them in. In some places these collections are grouped into definite areas called *Sileras*, which are occasionally surrounded with a wall, and even have a watch tower. In one place, Boursasot, the whole surface of the enclosure is paved with flagstones. The dimensions vary from six or eight to between thirty and forty or more feet deep, and while some are so narrow as scarcely to amount to more than wells, others widen out to fifteen feet or more. The depth is a matter of indifference if water does not stand within four or five feet from the bottom. The majority of silos contain under 100 *fanegas*—one fanega equals 1·55 bushels. From this the size runs up to 8,000 hectolitres, or about 27,000 cubic feet.

The floor of the silo is prepared by spreading it with bavins and matting, while the sides are covered with long straw, fern, or mats. Where the soil is unsuitable, the silos are built in masonry under the soil, this is also a common custom where a regular trade in corn requires permanency in matters connected with the business. Spain exports grain from such stores, and it is likely that some may reach this country.

Silos are in use in parts of Southern France, which also is the continuance of an ancient prehistoric habit, although commonly credited to the Moors or Saracens. The preservation of corn in pits was certainly practised in Northern France during the first half of the last century, and, from what can be gathered, it is probable that the practice continued into the present century.[18]

Silos are the regular stores in Morocco, where, as in Spain also, they are called *Matamores*. In Morocco, the corn is threshed on the spot where it is harvested, and buried for indefinite periods. Thus immense accumulations may occur, and from such sources in 1830 great quantities were exported into Spain; in 1848 also some 15,000 *fanegas* were exported to Dublin, each time in aid of countries suffering from scarcity. In various parts of Northern Africa and eastward, silos are often square in shape, as well as round, some being of large size, and gathered in collections of surprising numbers. Most of these are dug in tufaceous soil or soft limestone. The custom prevails over all Italy, most of the pits being built in with masonry or brick, and in Tuscany largely with unbaked brick. In Styria, Austria, and Hungary, and in Central Europe generally, this habit is the rule. Some pits, as in Germany and in Poland, are of a more conical form than those in the south, while others are more bulbous, having marked shafts; while, again, the interior of others is square. They are occasionally plastered with some kind of cement, and all have straw or boards to keep off the damp from the corn. In Russia, fire is frequently employed to burn the sides to a kind of brick. In Hungary, Poland, and Eastern Europe, the pits are deep, and the corn frequently is placed in them undried or in a sprouting condition. The custom is to cover the whole with soil, which is ploughed and sown to efface the signs of the hoard—a sad evidence of insecurity and a relic of unsettled life. It is plain that the customs of Central Europe are nearly connected with those of Central Asia; and though there is no doubt that it is one of the earliest of habits, yet one cannot but believe that "this form of granary is the same as that between the Lena and the Oxus before the days of Arpad," and that it was either reintroduced or refreshed by the migrating hordes which came again and again from Central Asia, and peopled Russia and Europe with swarms of half savages.

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[18] It may, indeed, be continued to the present day in some out of the way places, for agricultural customs are strangely persistent.

NOTE.--The writer has experienced great difficulty in procuring information on the subject of the subterranean storage of grain, and in the search for caves which might have been excavated for this purpose, especially in this country, where the practice has been discontinued for so long a time. M. Doyère, who was investigating the subject at the same time as the writer, in like manner says:—"I have been astonished in Spain, and equally in France, at the insufficiency of positive information that one can collect while travelling, on things among which people dwell, and of the greatest importance to them; this it is which explains the erroneous notions which have been spread, especially on *ensilage*." English archæologists in general consider the subject foreign to their studies, there being no remains left on which to found an enquiry. Most antiquarians have given as little study to ensilage here in past times as the agriculturist gives to it in the present day.

When M. Jourdain was in Spain in 1810, the smaller husbandmen had no barns, and kept their corn exclusively underground, but there is plenty of evidence to show that the custom has now declined. French writers state that the same has happened in France, and perhaps it may be said of most countries. Just as there has been a falling off of the habit of storing grain in pits in recent times, it may be shown that it was more common and wide-spread in mediæval and earlier ages. M. Doyère says that all the towns of Spain had once collections of silos, which is certainly not the case at present. In searching for ancient silos, he came upon some interesting examples at Alcala; he could get no information about them, and he had to rely on his own observations, thus becoming personally acquainted with seventeen. He subsequently heard of about one hundred more of a like antiquity. He does not define the age, except by speaking of them as Moorish, though they may, from his description of the situation, be just as well of Roman age. The pits are close to each other. Some are filled up with surface rubbish, others less so; a result partially accounted for by the habit of passers by testing their depth by throwing great stones into them. From a small one which had a communication, of recent and accidental formation with another, he was able to enter and measure one of the large ones. This, which had a cone of rubbish at the bottom, could not have been less than ten metres deep, though the bottom was not reached. The mouth was narrow, originally narrower, and widening out gradually. This pit was excavated in a very hard rock, either with a pick or a hammer, some of the pick marks crossed each other. It once had a covering plate. Other such ancient pits have been met with at Cordova and elsewhere. It has always been the custom to store grain thus, from the earliest times in Spain, but it is very rare to find any account of the matter.

In France it was a commoner custom to store corn in silos, in comparatively recent times, as at Le Quercy, etc., than it is now, and still more so in the mediæval periods. Most of the instances recorded are, however, not merely pits, but *souterrains*, in which the hoard was secured in an inner enclosure. Of such a nature were the hoards at Montargis, St. Quentin, and elsewhere, described by M. Reneaume. The magazine at Metz, in which corn had been stored from 1575 to 1707, and at Sedan, are cases in point. The numerous simple, as well as the complicated, *souterrains* of Picardy, are of this nature; some, however, are greatly altered from their original simplicity, under the necessities required by troubled times. One of the most highly developed examples was described by M. Louvel. It consisted of little caverns, regularly arranged on either side of a kind of subterranean streets, in the chalk, the entrance to which was originally by a well. As appears by the records, such places have existed since the tenth century, beyond which no documents could be found. It appears clear that if they then served as stores, refuges, and dwellings, they must have existed in their pristine or simpler form for some period long previous; and that many of a very simple form, with no other outlet but the well, were primarily stores, thus closely resembling English deneholes. Certainly the Romans made use of chalk caves as magazines, and the receptacles of masonry for corn, constructed in a *souterrain* at Ardres, still remain to show their practice. We have the evidence of Tacitus, coupled with that of Cæsar, for the use of silos in Northern France and Belgium, by the earlier peoples.

. That such places, originally stores, were frequently used as dwellings and refuges during religious wars, is well known; and the value of caves with small entrances and galleries beneath the surface, to persecuted people, is admirably illustrated by Victor Hugo, who, in his "'93," vividly describes such places in Brittany, from his personal knowledge. These last, however, may have been mines.

In Britain grain pits were in use before the Romans came; and examples were luckily preserved intact to our inspection by the rubbish they poured into them. In North Kent, some of these are admirably finished, the pick blows having been moderated in force and neatly applied to make an even surface. In one pit at Northfleet, for instance, the chalk was chipped almost to smoothness; at one part where a pipe of gravel had come in the way of an even rounding of the cave, the chalk had been trimmed to the thinness of two inches only. The coarseness in workmanship of many of the deneholes of S. E. England, is no evidence of their use originally—it does not appear that the workmanship would affect the preservation of anything within them. Besides the distinct assertion of Diodorus, that corn was preserved in pits in Britain, there can be little doubt that this method, which Tacitus says was employed by the Germans (the ancestors of the Belgæ and other tribes of Northern France), was also used by some of those tribes who migrated to Britain. Although most of the caves of Kent and Essex are large, some are quite small. The making of a great cave, when the excavator was obliged to go deep beneath the surface, is the equivalent under changed circumstances for many shallow caves at a slight depth. The construction of great grain pits in Britain is also the result of a peculiar habit, not alleged of the inhabitants of any other country, viz., that the corn was stored in the *ear*, thus requiring increased space, one peculiarity whose consequences must have affected many details in the garnering of corn.

The deeper grain pits of Britain are in clusters, as well as scattered. They are placed, as elsewhere, generally on high ground, although they are also found on low valleys, which were dry in Roman time, but which have since become water logged.

Very few instances of pits suitable for storing grain have been found except in the chalk, and these have been preserved chiefly in consequence of their great capacity and their narrow entrances.

The means of getting into and out of the modern grain pit is by windlass. Those, however, which have round shafts, have foot-holes on either side of the shaft and opposite each other. When the shaft is square, as in Africa, the holes are formed in the sides near a corner, or one on each side of a corner as in the shafts found in Egyptian tombs. In such cases the shaft is too wide to straddle across.

The mode of descent by the corner holes is curious. It was first noticed (and was actually employed) in England, when a denehole was discovered at Frindsbury near Rochester, a year or so ago. At the time the hole was being examined the state of the shaft was thus:—The upper 2 ft. of disturbed soil and 10 ft. of brick earth, which was very hard and sandy, had been cleared away for bricks; then Thanet sand 10 ft. to chalk. The shaft was of the ordinary circular form in the chalk and some way up in the Thanet sand, but then it commenced to become angular, and at the junction of the Thanet sand with the brickearth presented a rectangular form, the edges being nearly regular, with the following dimensions, 6 ft. by 7 ft. 6 in. The footholes in the lower part were placed as usual, and were of the usual depth; as the shaft got too wide the holes were placed, one row in an angle and another about the width of a man's chest on the left of the angle in the broad face. At this part the holes were very deep, as deep as the whole extent of a man's arm. In ascending, therefore, when the widening began, the climber had to throw himself over to one side only, and pass his arms up to the shoulder, hugging the rock to his body while shifting the leg and other arm, which, in its turn, hugged the rock. The descent appeared to be much less agreeable where the critical change in attitude had to be made. The man who shewed these old means of ascent and descent was singularly agile. To ordinary people the process would have been attended with great risk, which is not the case with the common process. The original shaft was probably circular and regular from top to bottom. The splaying out above was clearly the result of a later alteration, and appeared to be coincident with the irregular enlargement of one of the originally equal sized caverns below.[19]

Before storage in pits and silos, the corn is separated from the ear. It should be most thoroughly dried before it is deposited, and when this is properly done the corn remains sweet, and retains its vitality, for several years, as long, in fact, as it does in stacks and barns, the central part of the store being selected for seed by preference. Bread has been made on several occasions from corn buried more than one hundred years, well authenticated instances of which have occurred in France and other countries of western Europe. But it would not vegetate. When corn is buried in the rock a short or a long time, the exterior of the heap becomes more or less damp, and heats. This either causes actual abortive germination or mere preliminary fermentation. The result is the formation of a "*croute*," or cake of varying thickness and great density. Its hardness is so great as to prevent, after a certain thickness has been attained, the further access of humidity and oxygen to the mass, and even to permit a man to walk on it without breaking through; the corn within is practically self-sealed.[20] In all ancient hoards this has been observed, and it appears to have been turned to account, for M. Reneaume says that in his time a *croute* was artificially formed in great warehouses and granaries in France by damping the corn, and he expresses his opinion that it is the best form of preserving. Certainly it was no new discovery, for we have Varro telling of a similar process. After describing the lofty and airy granaries in Italy in his day, he continues, "Some sprinkle *amurca* over the wheat, others sprinkle something else, as chalcidian, or carian chalk, or absinthium"; and he also tells us that "*amurca* is a watery fluid pressed from the olive." Therefore it is clear that when the corn is in large quantities, a somewhat damp cave might not be disadvantageous, provided that there was no actual water in it.[21]

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[19] In a pamphlet by Mr. C. Bird, called "Rochester Deneholes," this shaft is drawn in the figure as circular from top to bottom. This was not the case, as is above described.

[20] In Mr. Holmes's paper on "Some Curious Excavations in the Isle of Portland" (Proc. Geol. Association, vol. viii., page 408), the production of carbon-dioxide in the grain-pits of South India by the partial fermentation of the store, is noticed. During the discussion which took place at the reading of this paper, Prof. Meldola pointed out that the existence of the dioxide in the closed pits would act as a check to fermentation, and that nothing would more effectually preserve the mass of the grain than the presence of this gaseous envelope.—ED.

The pits in some parts of Spain are occasionally opened to purify the interior, where straw, which rots away, is employed to ward off or arrest the damp. French and Spanish writers say that it is an essential matter that the corn should all be emptied out of a pit at once (*tout à la fois*) and consumed at once. Varro tells us that "those who keep their corn underground in pits, take the corn out some time after they are opened, as getting into them is attended with danger when they are first opened, from the confined air in them." And in the present day, it is the practice to let a certain period elapse before a descent is made into a newly-opened silo.

The following works are especially valuable as sources of information on the above subject:—

Jourdain, "Annales de l'Agriculture Française," 2 serie, tome vii., page 325.

Lasteyrie, Count C.P., "Des fosses propres a la Conservation des Grains."

Reneaume, "Mem. de l'Academie des Sciences" for 1708.

Doyère, L., "Conservation des Grains."

Rollet, A., "Memoir sur la Meunerie."

Many books and references are cited in a paper on deneholes by F. C. J. Spurrell in the "Archæological Journal" for 1882.

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[21] And it is evident that the larger the cave and the quantity of corn in it, the less would be the comparative waste from the formation of the *croute*.—ED.

THE ESSEX FIELD CLUB.

ORDINARY MEETING, Saturday, November 26th, 1887.

THE Eighty-third Ordinary Meeting was held at the Public Hall, Loughton, at seven o'clock, Mr. T. V. Holmes, President, in the chair.

Donations of books and periodicals were announced, and among them the Secretary called special attention to a very valuable work on the legal history of the "Forest of Essex," presented by the author, Mr. W. R. Fisher; and also to a small book entitled, "The Stratford Flora," presented by Mr. Shenstone, which appeared to have escaped the notice of Essex bibliographers.

The following were elected members of the Club:—Mr. W. H. Dalton, F.G.S., and Mr. W. Greatheed. [By accident, the election of Mr. A. Cunnington and Mr. Clement Hutt was not recorded in the Minutes of the meeting on November 12th; this note is consequently inserted to rectify the error.]

Prof. Meldola read a letter received by him from Mr. A. C. G. Cameron, of the Geological Survey, dated Bedford, November 25th, giving some particulars of a supposed earthquake shock which had been heard or felt in various parts of Bedfordshire, Cambridgeshire, and Essex, on the morning of November 20th. [A very considerable amount of information has since been collected with respect to this phenomenon, and Mr. G. J. Symons, F.R.S., has suggested that it was not an earthquake, but that the noise heard was occasioned by the explosion of a large "bolide" or meteorite. By the kindness of Mr. Symons, Mr. Fordham, Mr. Cameron, Mr. Worthington Smith, and others, we shall be enabled to print full particulars of the occurrence in an early number of the ESSEX NATURALIST.]

A paper, entitled "Preliminary List of the Land and Fresh-water Mollusca occurring in the neighbourhood of Felstead, Essex," by Mr. J. French, was read. Mr. French enumerated fifty-seven species as occurring in his district, the slugs not being included in the list.

Mr. Walter Crouch made a few remarks upon the paper, and thought that the list was by no means a small one from such a locality, allowing for the limitations made by the recorder.

Prof. G. S. Boulger, F.L.S., F.G.S., then read Part II. of his "History of Botany in Essex." The first part, giving the narrative up to and including Ray, was read at a former meeting of the Club. The present instalment included Samuel Dale, of Braintree, friend and executor of Ray (1659-1739), his "Pharmacologia" (1693), his "History of Harwich and Dovercourt" (1730), and his herbarium—Richard Warner, of Woodford (1711-1775), his "Plantæ Woodfordienses" (1771)—Dr. John Fothergill, of Upton (1712-1780)—The Forster family, of Walthamstow. Edward Forster, *senior* (1729-1812)—Thomas Furley Forster (1761-1825)—Benjamin Meggot Forster (1762-1829)—Edward Forster, *junior* (1765-1849), and Thomas Ignatius Maria Forster (1789-1860). Prof. Boulger gave a most interesting series of biographies of these worthies, with details of their botanical labours. [We hope to be enabled to print the whole (with the exception of the memoirs of Ray and Gibson, which have already been published by the Club) in the ESSEX NATURALIST during the ensuing year.]

The President said that Prof. Boulger had treated his subject in a most thorough and pleasant manner, and he thought that the gratitude of the members was due to him for his labours in elucidating the life and works of the Essex botanists.

Prof. Meldola very heartily seconded the vote of thanks, and in doing so quoted the observations of Prof. Bayley Balfour, communicated to the Manchester Conference of Delegates of Corresponding Societies of the British Association, as to the importance of observing and recording the "life-histories" of plants from the germinating seed to the production of seed again. This subject had been alluded to by Prof. Meldola in a late number of the ESSEX NATURALIST (vol. i., page 200), but he thought that these suggestive remarks merited careful consideration, and could not be too widely read. Prof. Balfour said :—

> "It appears to me that much good scientific work might be done by members of local Societies in a direction which has not attracted so much attention in Great Britain as it deserves. The discovery and description of new forms, and the distribution of our indigenous plants, are, in Botany, the lines upon which most of the energies of local Societies are principally spent, whilst habit, construction, and generally the features of life history of plants come in for attention in quite a secondary way. This arises, I think, in great part from the prevalent notion that the facts of the life history of our common plants are all well known, and that there is little, if anything, more to find out about them. That this is an erroneous idea may easily be shown—witness, for example, the interesting observations recently published by Sir John Lubbock—and there is a field for a great deal of sound work upon plants growing at our doors.
>
> "Within recent years Mr. Darwin's work, followed up by that of such men as Hermann Müller, Kerner, Ogle, and others, has given a stimulus to observations of adaptations between the vegetable and animal kingdoms in connection with pollination in flowers; and many interesting facts about British plants have been brought to light by workers in local Societies. But little has been done for the subject of the vegetative organs of these plants—I mean the arrangement, true nature, and structure of the members that carry on plant-life. In Germany many years ago Wydler and Irmisch published a splendid series of contributions to the knowledge of these features in indigenous German plants—why has this not been done for Britain?
>
> "Now I venture to think that good results would follow if you would bring before the Delegates at the meeting to-day the importance of encouraging the members of their Societies to study the life histories of indigenous plants in their entirety, *i.e.*, from the stage of embryo in the seed up to the production of fruit and seed again. Anyone who will take up this line of study will assuredly derive great pleasure from it, and will be able to add a great deal to the sum of our knowledge of plant-life. Such work can be well combined with the more usual systematic work, it can be easily accomplished, and it will be found to give much additional interest to the study of British Botany."

At the Manchester Conference Mr. C. P. Hobkirk had said that the subject was a most interesting one, and he considered that the time and energies of the members of local Societies would be far more usefully employed by following the lines indicated by Professor Balfour than, as at present, in simply collecting, naming, and registering local plants. Although the compilation of local floras was most useful and necessary work, yet the elucidation of the actual life histories of individual forms was now of really paramount importance, and members of local Societies should be urgently requested to carry on this work without delay. Prof. Meldola, without questioning the value, from many points of view, of accurate catalogues of local forms, and the collation of facts recorded by former observers, strongly advocated the views above put forward.

The vote of thanks to Prof. Boulger was carried by acclamation.

The Essex Herbarium of the late Rev. Thomas Benson, presented to the Club by Mrs. Sidney Thorp, was exhibited in the room.

The usual conversazione concluded the meeting.

ORDINARY MEETING, Saturday, December 17th, 1887.

THE Eighty-fourth Ordinary Meeting was held in the Public Hall, Loughton, at seven o'clock, Mr. T. V. Holmes, President, in the chair.

Mr. James E. Lickfold was elected a member of the Club.

In accordance with Rules III. and VI., nominations of new members of Council and Officers for 1888 were made as follows:—

The following members retired from the Council:—Messrs. W. Law Bros, J. Hutchinson, A. Lockyer, and F. H. Varley; the two latter offering themselves for re-election.

To fill the seats so rendered vacant, the following members were duly proposed for election:—Messrs. C. Oldham, A. Lockyer, F. H. Varley and Walter Crouch (Mr. Crouch had been nominated by the Council, in accordance with Rule VI., some months ago, to fill the seat vacated by Mr. Bros.) No other candidates having been proposed, these gentlemen stand elected at the Annual Meeting to be held on January 28th, 1888.

As *Officers* for 1888, the Council nominated the following members:—*President*, Mr. Edward A. Fitch, F.L.S., F.E.S. (Mayor of Maldon); *Treasurer*, Mr. Thomas Royle, F.C.S.; *Secretary*, Mr. W. Cole; *Assistant-Secretary*, Mr. B. G. Cole; *Librarian*, Mr. A. P. Wire. No candidates were proposed for the offices of Assistant-Librarians.

Mr. Walter Crouch was appointed *Auditor* on behalf of the Council, and Mr. C. Ridley on behalf of the members.

Mr. E. A. Fitch exhibited fragments of some Cinerary Urns (British ?) found about eighteen feet to the north of Baron's Lane, Purleigh, Essex, where ballast is being dug out and burnt. The urns were all at one level, about eight feet from the surface, and were on a slab of charred wood which could be traced for over six feet of its length. The soil had apparently not been disturbed above the deposit. The urns were all filled with calcined bones. Mr. Fitch called attention to the well-finished hollow-bottoms of many of the specimens.

Mr. Fitch also exhibited a large specimen of a fossil *Nautilus* (*N. centralis* ?), over nine inches in diameter, found in the railway tunnel under Spital Road, Maldon, twenty-six feet below surface of highway, in the London Clay, which there lies beneath fourteen to sixteen feet of drift.

Mr. Fitch also brought up a case of samples of borings from a new well in the London Clay, in the yard of the Purleigh Station, on East Canney Farm, Cold Norton, Essex, together with a section of the same, kindly lent to him by Mr. W. T. Foxlee, engineer to the Great Eastern Railway Company. Particulars will be given in a future number.

Dr. F. H. Davies communicated a note on the whale lately cast ashore at Tilbury, Essex, together with several photographs of the animal taken by Mr. R. Hider and Mr. J. G. Wingrove. Mr. Walter Crouch, F.Z.S. made some very interesting remarks on the animal, which he believed to be Rudolphi's whale (*Balænoptera borealis*), illustrated with drawings and specimen of the baleen. Mr. Crouch's remarks will be printed in full in an early number of the ESSEX NATURALIST.

Mr. F. W. Rudler, F.G.S. (*Curator of the Museum of Practical Geology, and Director of the Anthropological Institute of Great Britain*) then delivered, in a very eloquent and instructive style, a lecture on "The London Clay," the lecture being illustrated with a large array of geological maps and "sections," and specimens of the various fossils and mineral constituents of the London him to expect them. But let him, on the other hand, start from the Thames northward, and he will find that his geological guide soon begins to fail him utterly. He will not, indeed, find much to complain of in Essex or south of Aldborough, inasmuch as the rocks on the Essex and the southern part of the Suffolk coast consist chiefly of London Clay, Red Crag, and Alluvium, all which formations are recognised on non-drift maps. North of Aldborough, however, the traveller would expect to find chalk cliffs, with hardly a break, thence to the Wash, but would discover, to his astonishment, that the cliffs at Southwold, Lowestoft, and Yarmouth are composed of sand, gravel, and clay of some kind. At Yarmouth he might learn that the top of the chalk was reached in a well at the depth of five hundred and twenty-six feet below the surface, which is there, as most people know, but a very few feet above the level of the sea. Proceeding northward, he would, after crossing some low ground, and passing some cliffs with much-blown sand banked up against them, but all composed of soft materials, arrive at Happisburgh, no chalk whatever having been seen so far. From Happisburgh to Weybourne the nature of the sea cliffs is admirably shown in Mr. Clement Reid's sheet of continuous sections between those places, published two or three years ago by the Geological Survey authorities. From it we learn that nowhere between Happisburgh and Cromer does the chalk appear in the cliffs except at Trimingham, though its top cannot be many feet below their base. And at Trimingham the chalk appears only in the shape of two bosses of no great size, about half a mile apart from each other; the result apparently of contortions in that formation which have forced it above its ordinary level at those two points. West of Cromer the chalk becomes more or less visible on the foreshore, and as Weybourne is approached it is seen to form the base of the cliff. Here and there, along the portion of coast illustrated by this section, as at Trimingham and Cromer, the cliffs reach a height of 200 ft. or more. Sometimes on the foreshore only, sometimes also forming the base of the cliff, a band of Pliocene Beds appears. The section being drawn to a true scale, the cliff at the Lighthouse Hills, Cromer, may be seen to be composed of about 6 ft. of Pliocene Beds, surmounted by more than 200 ft. of Glacial Drift; at Trimingham, of 4 or 5 ft. of Pliocene and 190 ft. of Drift, or thereabouts. And a glance at the section generally will suggest the notion that to a person seeking information as to the geology, or the agricultural capabilities of northern Norfolk, or as to its advantages

SUBSCRIPTIONS.

Subscriptions (10s. 6d.) for 1888 *became due on January 1st*, and should be sent at once to the TREASURER, THOMAS ROYLE, Esq., "Dalton House," Upton Lane, Forest Gate, E. POST OFFICE ORDERS should be made payable at STRATFORD, E., and Cheques crossed "London and County Bank," Stratford Branch.

LIBRARY AND PUBLICATIONS OF THE ESSEX FIELD CLUB.

It is requested that all enquiries respecting the Library, donations of Books and Periodicals for the same, *and all orders for the Publications of the Club*, be sent to the LIBRARIANS at the HEAD-QUARTERS, 8, KNIGHTON VILLAS, BUCKHURST HILL, ESSEX.

All the Publications of the Club are still in print, but Parts 3 and 4 can only be supplied with complete volumes:—*President's Inaugural Address*, 6d.; *A Day's Elephant Hunting in Essex*, 1s.; *Transactions*, Part 1, 1s.; Part 2, 2s.; Part 5, 5s. 6d.; Part 6, 7s. 6d.; Part 7, 10s. 6d.; Part 8, 5s 6d.; Vol. I, unbound, 6s.; Vol II., unbound, 15s.; Vol. III., unbound, 16s.; Vol IV., Part 1, *Transactions*, 5s.; Part 2, 3s.; Do., *Proceedings*, 3s.; *Report on East Anglian Earthquake*, 3s. 6d.; *Reports on the Explorations of the two Ancient Camps in Epping Forest*. A few authors' copies of these reports are in hand, price 4s., post free.

Papers and Memorials on the Protection of Wild Animals and Plants, and the present condition and future management of Epping Forest, 1s.

Report on the Denehole Exploration at Hangman's Wood, Grays, 1884 *and* 1887, with three coloured plates and other illustrations, 2s.

The Essex Naturalist for 1887, with five plates and other illustrations, in numbers as published, 10s.

THE EAST ANGLIAN;

Or, NOTES AND QUERIES on subjects connected with the Counties of

SUFFOLK, CAMBRIDGE, ESSEX & NORFOLK,

Edited by the Rev. C. H. EVELYN WHITE, F.S.A, F.R Hist.S., Vicar of Christ Church, Chesham; Hon. Mem. (late Hon. Sec.) of the Suffolk Institute of Archæology and Natural History, etc.

Part I., commencing an entirely New Series of this well-known serial was issued 1st January, 1885, and is published monthly. Vol. II. commences January, 1887. Annual Subscription, 5s. Post Free. Single part sent on receipt of Sixpence in stamps.

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Forthcoming Meetings of the Essex Field Club.

ORDINARY MEETING.

SATURDAY, April 28th, 1888.

The Eighty-Eighth Ordinary Meeting of the Club will take place at the Public Hall, Loughton, Essex, on Saturday Evening, April 28th, at Seven o'clock.

After Exhibitions, etc , the following papers will be read:—

I.—"Fifty Years ago in Essex."—By Henry Laver, M.R.C.S., F.L.S., F.S.A. (*Vice President*).

II.—"The Origin of 'Sugaring.'"—By Miller Christy.

III.—"On some Essex Boulders."—By Rev. A. W. Rowe, M.A., F.G.S.

The Rooms will be open at Six o'clock, for the convenience of Exhibitors, &c.

VISIT TO THE BRITISH MUSEUM OF NATURAL HISTORY, CROMWELL ROAD, SOUTH KENSINGTON.

THE NEW INSECT GALLERIES.

SATURDAY, May 5th, 1888.

The arrangement of the Public General Collection of Insects having recently been completed, it is thought that many of our members will be glad to have an opportunity of meeting to inspect the extensive world-wide series now exhibited.

Members will assemble in the Entrance Hall *at 2.45 p.m. on the above date*, when Mr. C. O. Waterhouse (*Assistant-Keeper of the Insect Department*) will conduct them through the galleries. Special facilities for viewing the collection will be kindly afforded by the authorities, but on account of the very heterogeneous nature of the series, including as it does all orders of the Insecta, there will not be any formal demonstration on this occasion.

It is proposed to visit also the British Collection of the Class contained in the British Pavilion at the end of the Central Hall, and the Insect Department of the Index Museum, both of which are at present still under arrangement.

The Museum will remain open until dusk. Tea can be had either at the Natural History Museum or at the Arts Museum in Cromwell Road, where there is ample accommodation.

A Forest Ramble Meeting will probably be held on May 12th, of which notice will be sent to Members by circular.

WILLIAM COLE, *Hon. Sec.*

WILLIAM WHITE, *Hon. Sec. to Field Meeting Committee.*

Head Quarters, 8, *Knighton Villas*,
Buckhurst Hill, Essex.

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SEE NOTICE OF FORTHCOMING FIELD MEETING ON SEPARATE CIRCULAR HEREWITH.

The
Essex Naturalist:

BEING THE

JOURNAL

OF THE

ESSEX FIELD CLUB.

EDITED BY

WILLIAM COLE,
Honorary Secretary.

Contents:

On the Alluvial and other Recent Deposits at Felstead, Essex (*concluded*).—By J. FRENCH 57
Notes.—Stratford Bakers; A Pleasant Ride in Essex 60
The Re-appearance of Pallas's Sand Grouse *(Syrrhaptes Paradoxus)* **in Britain and in Essex** 61
Neolithic and Palæolithic Scrapers, Replaced and Re-worked (*illustrated*).—By WORTHINGTON G. SMITH, F.L.S., etc... 67
Notes.—Fossil Coleoptera at Lexden; The Origin of "Sugaring": to whom does the credit rightly belong?—MILLER CHRISTY; A White Blackbird; Squirrels Killing Small Birds—E. A. FITCH; Rabbit Pursuing Weasel—F. FRENCH; Capture of a Badger in Essex; The Hoopoe; *Vanessa Antiopa* at Walthamstow; Risso's Grampus in the River Crouch—H. LAVER; Rats Eating Beet—E. A. FITCH; Bats Flying in the Daytime—MILLER CHRISTY; Pied Stoats at Chelmsford—E. A. FITCH; Hoopoe at Grays—W. R. SACKETT; Golden Oriole in Essex—MILLER CHRISTY; The Attempted Extermination of Jays in Epping Forest—Prof. G. S. BOULGER; Yew Sapling and Birds in Epping Forest—F. W. ELLIOTT; Large Chestnut Tree.. .. .. 69, 73
Essex Field Club—Reports of Meeting at Wanstead, April 21st; Ordinary Meeting, April 28th; At the British Museum, May 5th; A Spring Forest Ramble, May 12th 74, 88

The authors alone are responsible for the statements and opinions contained in their respective Papers.

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N.B.—SUBSCRIPTIONS FOR 1888 ARE NOW DUE, SEE FOURTH PAGE OF WRAPPER.

THE LIBRARY OF THE ESSEX FIELD CLUB.

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2. Grants from the Council.
3. Special donations.

And additions to the Library are obtained—

1. By purchase.
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3. By donations.

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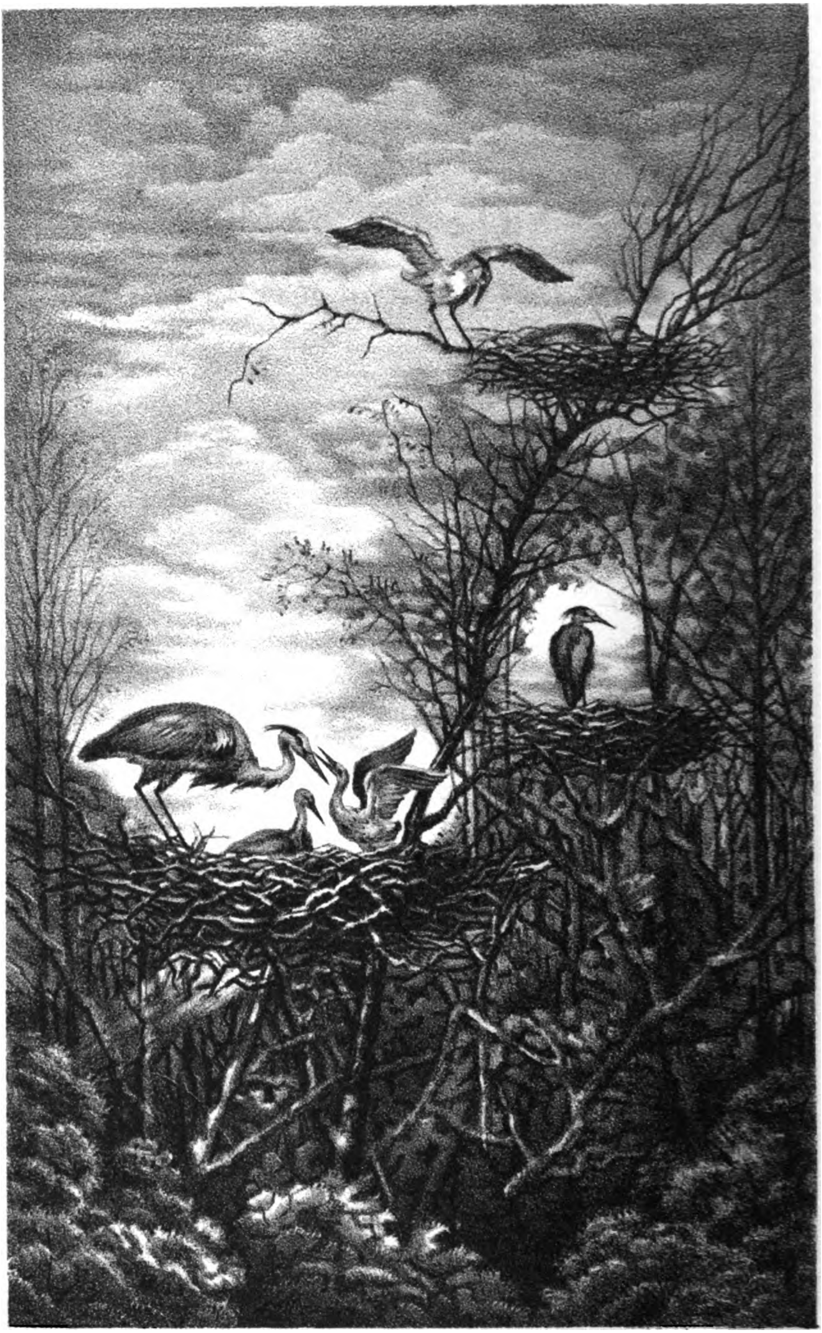
8, KNIGHTON VILLAS, BUCKHURST HILL, ESSEX.

In contemplating the origin of this alluvium, we are led back to a time when the valleys were being eroded through the gravels and Boulder-Clay of Glacial origin which form the surface of the district. We are justified, too, when examining these Glacial beds, in making surmises as to the previous contour of the country, and as to the immense length of time which has elapsed since the epoch of their deposition. We know, for instance, that the Glacial gravels were sometimes formed on sloping surfaces, for at North End there is a gravel-pit where the stones lie with their long diameters parallel to the slope; again, on the Stebbing road section near the Broadway, the same state of the gravel obtains.

All these Glacial deposits are, in Essex, destitute of organic remains, that is to say remains of a *contemporary* fauna or flora, and the previous erosion was eminently destructive—a very significant circumstance to take into consideration when we speak of the time which has since elapsed, and equally significant in speaking of the interval between the deposition of the Glacial beds, and the first evidences of a returning fauna—the shells of the alluvium.

In order to conceive of the beginning of the river alluvium, we must try to get an idea of the course of the stream along the valley through this Glacial rubbish. It would appear that the conditions at first, and for a long time, were unfavourable to the deposition of alluvium. The gravels, where reaching the surface, were permeable, and the Boulder-Clay was planed off with uniform descent seaward, offering no check to the drainage, nor would there be much vegetation *for a long time* to hamper the progress of the water from the first moment of its journey—the tiny runlet—to its final outfall into the sea.

The next stage is that in which the gravels, laid bare here and there, became impervious by saturation and were eroded more rapidly than the clay: we should then have the conditions under which the alluvium was formed, that is of lakelets all along the valley. We are pretty sure that the alluvium was deposited in still water because of the fineness of the ingredients of which the clay is composed—being the last residues of muddy water thrown down. With the exception of the plants and animals that came upon the scene and played a subordinate part in its formation, there does not appear to have been much to cause change in the growth of the deposit down to the time when man interfered and laid it dry. The rains and floods smoothed the sides of the valleys, took off the tops of the hills, and



C. Whymper del.

J. L. Macfarlane lith.

The Heronry in Wanstead Park. Essex.

I will take in the first place the question of how the Essex Field Club stands with respect to meteorological work as compared with similar bodies throughout the country, and I must say, and I say it with great regret as I have the high privilege of being one of your Honorary Members, that you have yet your spurs to win in that way. Up to the present time the Essex Field Club has not done what I venture to think it ought to have done in meteorological work.[1] But this is very soon mended, for it is excessively easy to put yourselves in a very different position from that which you hold at the present time as regards meteorology. Perhaps the most practical thing will be to comply with the tendency of this world, which is to go after things we can see the result of at once; and in meteorology that will be the rainfall, on which our water supply wholly depends; because, of course, every spring is only rain-water which has percolated and risen up again. With respect to that branch, a good deal has been done in Essex of late years by Mr. Radford Sharpe, who is a member of this club. Mr. Sharpe some time ago began to collect returns from the observers who are scattered over the county; and he printed them in some of the Essex newspapers. Unfortunately, the pressure upon his time has been such that he has had to drop the work, and I think it most desirable that the Club should take up that which he did as an individual. I do not think that work of this sort should be laid upon the Secretary of the Club, but I hope that among the members someone will volunteer—someone who is familiar with figures, and who is not afraid of decimals—and prevent this work falling on the shoulders of the Secretary. There is one little thing I have got ready for this evening because I thought that probably someone would propose to help us, and the first thing as regards help is to know the districts from which it is most required. I am afraid that this map is somewhat too small, but what I am holding up before me is a map of Essex—the county with which you have to do. Those red spots that you see are the places at which, at the present time observations are being made, and the few blue ones outside are simply to indicate how far the neighbouring counties are provided for just where they come into contact with the boundaries of Essex. Now, that is a fairly general distribution, but there are one or two districts that I could name where observers are very much wanted; for instance, they are needed round Thaxted, Raleigh, and Chipping Ongar. Rainfall observations are extremely easy to make, but the great thing one desires with respect to them is continuity. Unfortunately, persons change houses, or they die, or get married; all sorts of things come in and upset the arrangement. Observations may have been going on very well indeed when something happens, and away go the observers. In one of the Welsh counties the observers in two years ran down from eighteen to four, the other fourteen having gone away from one cause or another. And, therefore, though this map shows that Essex is at the present moment fairly well represented, I cannot guarantee these observations will all be going on next year; therefore one welcomes what at first sight might appear an unreasonable number of observers, because even if you have three in a town, two out of the three, or even all three may from one cause or another disappear, and the consequence is that it is not easy to have too many, because you will readily understand that the first thing one wants in meteorological work is continuity. I could illustrate that perhaps as well by one fact upon which I shall have to say something, as in any other way, and that is the question of the deficient water supply which has occurred in some parts of Essex, I believe, even up to the present time, and which was produced by the drought of last year. But was 1887 one of those exceptionally dry years which is going to turn up only once in a century? Nothing of the sort! I have all the figures here, and have made a little table which some day may appear in the ESSEX NATURALIST. Many persons fancy that 1887 was something unprecedented as a dry season; it was so in other parts of the country, but not so in Essex. And therefore if there is, as I am told is the case, a deficiency in the quantity of water in a good many of the Essex wells, it is due to the distribution of the rainfall rather than to the total amount during the year.

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[1] It may be pleaded in defence of the conduct or misconduct of the Essex Field Club in this connection, that the default has not arisen from any want of appreciation of the interest or value of such records when kept within due bounds, but from the difficulty experienced in obtaining the assistance of a competent person to condense and tabulate the material sent in by observers. We may be permitted to say, as the result of pretty extensive reading of the publications of local societies, that meteorological records are apt to run rampant if care be not taken to compress and digest the data obtained. The observations from a very few stations, if printed in the customary manner, would suffice to fill the pages of the ESSEX NATURALIST to the exclusion of all other subjects. But we can truthfully assert that the Council and Editor would welcome heartily any carefully considered scheme for the systematic and persistent registration of the rainfall in Essex, and other meteorological data of interest. We hope to be in a position shortly to announce that such a scheme has been agreed upon; in the meantime we ask for the co-operation of our members in the proposed work.—ED.

Now, with respect to the measurement of rainfall, I said that it was an extremely simple operation, and I think I shall convince you that there is not only no one in this room who could not do it, but that you could hardly find a housemaid who would not make a first-rate observer. It is simply a case of a little patience and trial. I have not brought a rain-gauge with me, but I think we can do nearly as well without. Most of you know what a funnel is, and a funnel and a bottle make a rain-gauge with the single exception of the measure. The essential feature of a rain-gauge is the funnel, which is to be placed near the ground—about a foot above it. It must be level, and should be quite unsheltered by trees or houses. That funnel naturally collects the rain which would have fallen on the little bit of ground over which it is standing; the water passes down it into the bottle, and in a well-constructed rain-gauge no evaporation of the rain can take place when once it gets there. It is in fact a rain trap; the water is caught, and stops there until it is measured.

As to the patterns of rain-gauges and where to buy them, I must be cautious in what I say, for there is considerable jealousy among the manufacturers, and I am almost certain to be accused of favouritism by some one. As, however, I have never patented any pattern of rain-gauge, I may be credited with a certain impartiality in discussing the subject, and I will leave the field open to all, only giving a few hints to guide you in your choice.

Upon one point it is necessary to be despotic, viz., that amateurs should never try to make their own gauges; if they do, they are almost certain to go wrong in some respect, and nothing is more vexing, both to the observers and to myself, than for it to be discovered after observations have been recorded for a long time that the labour of years has been vitiated by the use of an inaccurate instrument.

For use in ordinary localities I think that the annexed (Fig. 1) is the best pattern; it is known as the Snowdon gauge; it is five inches in diameter, is easily fixed by four stakes, as shown; the glass jar, each division on which denotes $\frac{1}{100}$th of an inch of rain, when filled up to the top division holds 0·50 in., or half an inch; the bottle holds about three inches of rain, and of course, in the very rare case of the fall exceeding that, the excess is saved by the can, and must be carefully measured. A rain-gauge should not be set on a slope or terrace, but on a level piece of ground, at a distance from shrubs, trees, walls, and buildings—at the very least, as many feet from their base lines as they are in height. Tall-growing flowers, vegetables, and bushes must be kept away from the gauge If a thoroughly clear site cannot be obtained, shelter is most endurable from N.W., N., and E., less so from S., S.E., and W., and not at all from S.W. or N.E. The funnel must be set quite level, about 1 ft. above grass, and should be so firmly fixed that it will remain so in spite of any gale of wind or ordinary accidents. Its correctness in this respect should be tested from time to time, and if the funnel of a japanned gauge becomes so oxidised as to retain the rain in its pores, or threatens to become rusty, it should have a coat of gas tar, or japan black, or a fresh funnel of zinc or copper should be provided.

Having got the rain into the bottle, the next thing to find out is its amount; that you do quite as easily and much more pleasantly than when you have to take a dose of medicine; for measuring a dose of medicine you have a glass marked with certain divisions, and with respect to the rain-gauge you have a similar glass divided into hundredth-parts of an inch, and all you have to do is to pour the water from the bottle into the glass measure. Notice the divisions the water reaches up to, and write down the figures, *before the water is thrown away.* In making the entries in your note-book, if less than one-tenth (·10) inch of rain has fallen, a cypher must *always* be prefixed; thus, if the measure is full up to the seventh line, it must be entered as ·07, that is, no inches, no tenths, and seven hundredths. There must always be two figures to the right of the decimal point. Even in the case of one-tenth of an inch (usually written ·1) a cypher must be added, making it ·10. Neglect of this rule causes much inconvenience. The unit of measurement being ·01, observers whose gauges are sufficiently delicate to show less than that, are, if the amount is under ·005, to throw it away, if it is ·005 to ·010 inclusive, they are to enter it as ·01.

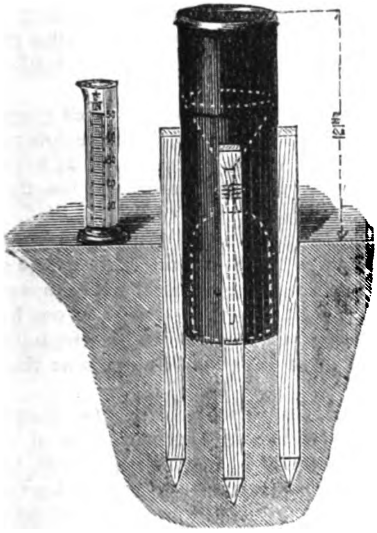

FIG. 1—The Snowdon Pattern Rain-gauge, as fixed in the ground in the place of observation.

Small amounts of water are at times deposited in rain gauges by fog and dew; they should be added to the amount of rainfall, because (1) they "tend to water the earth and nourish the streams;" and not for that reason only, but (2) because in many cases the rain-gauges can be visited only monthly, and it would then obviously be impossible to separate the yield of snow, rain, etc.; therefore, for the sake of uniformity, all must be taken together; and as except by watching all night it is never possible to be certain that small amounts are wholly dew, it is best to count all entries of ·01 in or upwards as days with rain.

Whenever there is the least doubt respecting the accuracy of any observation, the entry should be marked with a ?, and the reason stated for its being placed there.

The observations should be taken *each morning, sometime between* 8 *and* 9 *o'clock*, and the amount measured at 9 a.m. on any day should be set against the previous one; because the amount registered at 9 a.m. of, say the 17th, contains the fall during 15 hours of the 16th, and only 9 hours of the 17th. All columns of figures of observations should be cast *twice*—once up and once down, so as to avoid the same error being made twice. Never copy a total, always cast the column afresh. When there is no rain, a line should be drawn rather than cyphers inserted.

When very *heavy rains* occur, it is desirable to measure immediately on their termination, and it will be found a safe plan after measuring to return the water to the gauge, so that the morning registration will not be interfered with. Of course if there is the slightest doubt as to the gauge holding all that falls, it must be emptied, the amount being *previously* written down.

In view of any unavoidable absence every observer should train some one as an assistant; but where this is not possible, instructions should be given that the gauge be emptied at 9 a.m. on the 1st of the month, and the water bottled, labelled, and tightly corked, to await the observer's return.

Hardly a year passes in which some of our observers do not allow their gauges to overflow, it is therefore necessary to call attention to the fact that there does not seem to be any part of the British Isles where 4 inches may not fall in 24 hours. It is not desirable to purchase any guage of which the capacity is less than 4 inches.

Each observer should decide upon a specific name for his station, and notify immediately to the general recorder any change in the position of the gauge or the discontinuance of his record. Old established gauges should not be moved, nor their registration discontinued until, at least, two years after a new one has been in operation, otherwise the continuity of the register will be irreparably destroyed. Both the old and the new ones must be registered at the same time, and the results recorded for comparison.

It is desirable, but not indispensable, that observers should have two gauges, and that one of them should be capable of holding 8 inches of rain. One of the gauges should be registered daily, the other weekly or monthly as preferred, but always on the 1st of each month. By this means a thorough check is kept on accidental errors in the entries, which is not the case if *both* are read daily. Observers having two gauges and recording both daily, should keep the records distinct, and forward a copy of each to whoever has undertaken the task of collating the records for the county or district. Never take a mean of the two series of observations.[3]

Everyone will admit that to make and record the above described observations is not a very serious undertaking; it comes always with one's breakfast. At the end of the month whoever makes these observations, makes a copy of them, and sends them off to, we will say, the Secretary to the Essex Field Club, and the

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[3] For the convenience of observers, Mr. Symons has drawn up a set of blank forms, diagrams, etc., as follows:—

Form for Entry of Daily Rainfall	Fcp. folio		3d.
Blank Meteorological Register, with Instructions:			
For one year (stiff paper cover)	4to.	2s.	
For five years (half bound roan)	4to.	7s.	6d.
Diagrams for Barometer, etc., for one year ..	4to.	1s.	
Specimens of the above Forms and Diagrams ..	various		6d.

Any of these will be sent, post free, at the prices named, on application to Mr. G. J. Symons, 62, Camden Square, London, N.W.—Ed.

result is that by the end of the year you get the total of each month, and these totals added together give the yearly amount. You will soon get interested in the subject, and begin to compare the quantity which falls in one year with the quantity which fell in another year, and the quantity which falls in one part of the country with the quantity which fell in another part. As it happens, Essex is one of the driest parts of the British Isles, and the yearly average in this county is about 22 inches, and in rare cases it will not exceed 14 inches. That is to say if all the rain which fell had been preserved, if none of it had run away, or evaporated, then you would have had a depth of 14 inches all over the ground. Just for curiosity I may tell you what it is in the Lake district; instead of that 22 inches the average quantity of rain at the hamlet of Seathwaite is 140 inches, about six times as much as you have here; there is a spot there (the Stye) at a level of 1,000 feet where the rainfall in the average year is 175 inches, and where in a wet one it will reach 200 or 250 inches. I think I am right in quoting 225 as being the fall there in one year, that is, about ten times as much as there is here. That is somewhat of a wet place! Bearing on that I may give you a hint which may be useful for any who want to go to the Lakes to enjoy themselves. Don't go in the fashionable months of July, August, or September. That is almost the worst time you could go, but if you go in the spring months of April, May, or June, you will have very little more rain than if you had stayed in Essex. That is the time to go to the Lake district. I do not mean to say it never rains in the spring months. I was once making this remark about the desirability of going to the Lakes in the spring, and two years afterwards I met a friend who had been at the lecture. He said, "Oh, Mr. Symons, you did let us into it! You told us to go to the Lakes in the spring, and we went there in June, and it rained nearly every day." I said, "I am sorry; all I can say is that it was quite an exceptional case." He said, "Very likely, but we got the exception." But as a rule the rainfall in the Lake district is heavy in the summer and autumn and small in the spring months.

I think I have nearly disposed of the question of the rainfall, except that there is one form of it we should say a little about. That is *Snow*. There are few persons who examine snow minutely, but there is hardly a more exquisite body than newly formed snow if you view it under the microscope, or by means of a Coddington lens. True, you must put the microscope out of doors and get it thoroughly cold first, and then if you examine the flakes you will find them to be objects of extreme beauty. But meteorologists have to deal with snow from another point of view. Snow is of course water in the form of ice, and as such is to be got into our rain-gauge, and the most troublesome part—and indeed the only really troublesome part—of the duty of a rainfall observer is to measure snow. It is not comfortable to go out and measure snow, nor is it the easiest thing in the world to measure it; it drifts, and it is not easy to find places where the fall is level. If a fall of snow be heavy the rain-gauge funnel will be more than full, and then of course you are in a fix to know how much you ought to take, and sometimes when, as in the memorable case of January, 1881, the snow that falls in one field is whisked up and dropped down into the next field, it may be measured twice over, or the rain-gauge may be found to have been blown empty. To provide for such difficulties we have laid down some very simple rules. The first one is that if the snow is not more than enough to fill the funnel, you simply take your measure glass indoors and warm it, or else you will have it crack with the sudden chill. Fill it full of warm water, and pour that into the funnel; that will melt the snow and take it all down as water; then deduct the amount which you have added as warm water, and the difference between that and the total will be the snow. Another good plan is simply to take the funnel off the bottle, invert it in the snow, turn it round, and you will find that you can lift a complete cylinder of the snow, and you will then be able to see what you have got. A further rule is to measure a vertical depth of snow. Snow differs in its density; I have measured snow so dense that four inches of snow would give an inch of water, and snow so light that thirty-three inches only made one inch of water, and therefore it is difficult by the mere measurement of depth to know what quantity you have got. It is always desirable to measure that in the gauge, and also to take a cylinder up and measure that. Roughly speaking, snow is on the average just one-twelfth of the density of water, that is to say a foot of snow will give you an inch of water. But the method of measuring the depth of the snow, to determine the amount of water present, is a very rough one, and should not be adopted excepting in cases of necessity.

There is now, I think, but one other point to be noticed; one that will persist in coming into everything connected with accurate scientific research, and that is the *money question.* You may want to know what a rain-gauge costs, and what would be the expense attending the making of persistent and useful observations on the rainfall of your respective neighbourhoods.

Rain-gauges cost from 10s. 6d. to £1 1s. each. according as they are made of japanned tin, of galvanized iron, or of copper, and the makers generally charge about 1s. 6d. for a packing case to send it home in. The pattern I recommended and figured above, the "Snowdon Rain-gauge" can, no doubt, be obtained from any optician, but it may be convenient to give, in alphabetical order, the names and addresses of a few of the principal makers:—Casella, L., 147, Holborn, E.C.; Hicks, J. J., Hatton Garden, E.C.; Negretti and Zambra, Holborn Viaduct and Cornhill, E.C.; Pastorelli, F., 10, New Bond Street, W. There is one point to be observed, and that is—wherever, and of whomsoever, rain-gauges may be bought it is very desirable that the purchaser should insist upon having certificates of their accuracy. Rain-gauges are examined, and certificates issued, by Kew Observatory, and by myself, the charge in each case is the same, namely, 2s. 6d. Roughly speaking, therefore, you may take it that about 17s. or 20s. will provide you with a gauge all complete, and sufficient for all ordinary observations. As I hinted above it is desirable to have a second gauge of greater capacity for the purpose of checking the records, but even in this case the outlay would not be very alarming, and with care well-made gauges will last a long time. The only other expense is the very trifling one of some form of register in which to record your observations [already referred to on page 92.—Ed.].

Now we have to consider the practical results obtainable from meteorological observations, and I am afraid that I should give vent to some rather heretical ideas if I were to tell you exactly what I thought of such matters. Weather observations can be divided into two branches, or, perhaps, more. First of all we have the very practical one with respect to our wells, springs, and river supplies, and then we have what I may call climatical observations which afford information as to the relative advantages of different health resorts, the times at which it is good to sow or to reap, or to go to Brighton, or to Lowestoft in search of fresh air and fine weather, and various considerations of that sort. That is what I call climatical work. The general public have an idea that if they buy a barometer, and, perhaps, a couple of thermometers, they will know what weather is about to prevail next day and the day after that, but in that impression I do not at all agree. I have had something over thirty years' work at meteorology and weather observations, but I am quite sure that I don't yet know half as well as the ordinary sailor does what weather is coming. The fact is meteorological prediction can only be properly accomplished by the aid of those charts and maps which you see in the newspapers. The barometer at one place may be going up or down, and that is all you can determine by yourself from the barometer that you have bought, but the *meaning* of the rise or fall can only be ascertained by comparison with what the barometer is doing at other places; and consequently I should be sorry for anyone to run away with the idea that because they buy a barometer and some thermometers, and because they observe them regularly every morning at nine o'clock, and every evening at nine o'clock, they will be able to foretell what the weather will be. I believe they would know a great deal more if they left their instruments alone and looked at the clouds and the sunsets for inspiration as to the coming weather changes. But there is a further aspect of the case; climatical reports are required for medical men and for other purposes. Now it is a curious thing, which I cannot quite account for at the present time, that there is not a single climatical station in Essex. I believe this is the only county in England which does not contain a single climatical station. The expense for a climatical station is much more than for a rain-gauge, but it is not serious by any means. You require what is known as a Stephenson Screen. The original arrrangement was I believe made from a meat-safe, and the screen is certainly strongly allied to the meat-safe in its general appearance. It is a square box made with sides something like venetian blinds, and thermometers are placed inside that. You require the screen which costs about £2, and four thermometers which cost about £1 each, so you have altogether £6 for that, and these with your rain-gauge will complete your equipment. The thermometers you have inside are the maximum and the minimum—the dry and the wet—bulb thermometers; and having these your station is completely equipped. You will have noticed that I have said nothing about a barometer, and I have done so for this reason, that the barometer is not essential for climatical purposes. The changes of the barometer do not affect the public health to anything like a sufficient extent for it to be necessary for that purpose. Of course, if it marks a change of several inches in air pressure you would have results worthy of note, but short of so large a change as that there is no need of it for purely climatical purposes. The barometer is of more service in another way, and I should strongly recommend it to the members of the club if they are interested in knowing the relative heights of different places.[3] The Aneroid Barometer has had a large amount of abuse, but I for one have always stood up most strongly in its favour. They are extremely portable, and very reliable if reasonably well looked after.

Ere concluding I may tell you that when thinking about what I was going to say to-day, I called to mind the name of a man who was almost the first, certainly the second, observer in this kingdom of rainfall, and he was an Essex man. I allude to the Rev. Wm. Derham, of Upminster. He was born in 1657, and passed the Trinity College, Oxford, and got the living of Upminster in 1689.[4] In 1697, and perhaps before, he began making rainfall observations, and kept them going until 1716, but I am strongly of opinion that he was observing for many years after that. Unfortunately we cannot find—at least *I* cannot find—at present the rest of his observations. The Royal Society, as you know, is a very venerable society, going back to King Charles' time, and they have printed their "Transactions" from that time to the present. Many of Derham's observations are given in these volumes, but about 70 years ago an abstract of the "Philosophical Transactions" in eighteen volumes quarto was published, and I turned to that series to see what I could find about Derham, who was a fellow of the Royal Society, and whether the year's observations omitted in the "Philosophical Transactions" were given there; on the contrary, I found that the Editors year after year wrote with respect to them, "These observations are quite useless, and therefore need not be referred to;" and now here I, 200 years afterwards, would give a good deal to get back those observations which they so unceremoniously cast on one side. I was led to speak of Derham's observations by the fact that in one of his books he referred to a measurement of Snowdon made as far back as 1682. I think Essex may be proud of having a man who was not only engaged in active scientific observation in the county at that (scientifically) ancient period, but who actually travelled a considerable distance, when such travelling was a much more serious undertaking than now it is, to make observations with the barometer. Incidentally I may say that the observations he then made came out within something like 100 feet of those which have since been determined by the Ordnance Survey, which is a satisfactory degree of precision for that period. And now if you will excuse me I will detain you no longer.

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[3] Pocket Altitude Tables, containing short and simple rules for accurately determining altitude barometrically, have been prepared by Mr. Symons, and can be obtained at 2s. 6d. post free, on application to him at 62, Camden Square, London, N.W.—ED.

[We should mention that in compiling the above report of Mr. Symons' address, we have, by his kind permission, made free use of the valuable information contained in his pamphlet on the "Arrangements for the Systematic Observation and Record of the Rainfall of the British Isles" (1885).—Ed.]

A vote of thanks to Mr. Symons was, on the proposal of Prof. Meldola, passed by acclamation, and the members soon after separated into parties, wending their way to Theydon or Loughton. The evening was very fine and calm, and a woodland ramble appropriately brought the meeting to an end.

Compound Spike of Plantago.—On July 6th I found the enclosed compound spike of *Plantago* [? *major*] on a piece of waste ground bordering a field in Widford. Many plants of the same species were in the neighbourhood, but this was on the only one showing anything abnormal. You will perceive that it somewhat resembles the fig. 54 on page 109 of Dr. Masters' "Vegetable Teratology," but that the terminal spike is longer, and the lateral spikes less numerous and more irregular than in the figure, though there are more than a dozen lateral spikes, of which some are very small. It is also remarkable that so far as I could see each spike, taken by itself, would seem normal, without any thing remarkable in the way of bracts; the only eccentricity being in the number of spikes on the common peduncle. It would have been interesting to know if such an inflorescence would if left to itself have resulted in the production of fertile seeds. It is my opinion that it would, and that abnormal forms might be so perpetuated; but in the case of such a weed there would scarcely be sufficient motive for any one to pursue the experiment.—John Gibbs, Chelmsford, July 13th, 1888.

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[4] A sketch of the life and works of Dr. Derham is now being prepared by Prof. Boulger, and will probably be read at the meeting to be held at Upminster in June.—Ed.

PALÆOLITHIC IMPLEMENTS—LARGE AND HEAVY EXAMPLES.

By WORTHINGTON G. SMITH, F.L.S., M.A.I., etc.

All who have handled many Palæolithic implements must have observed the great size and weight of some of the specimens. Many large examples of Neolithic celts are known, but as far as my experience goes, they do not equal the more ponderous specimens of the Palæolithic class. No doubt the old River-drift men (as distinguished from the light-handed Cave-dwellers) were used to much rougher and heavier work than the men of Neolithic times: hence the occasional finding of huge and heavy Palæolithic tools.

In the following list I have given the size and weight of a few unusually large and heavy Palæolithic implements. These specimens have either fallen under my own personal observation, or have been heard of by me as belonging to other collections. I need hardly say that in this list I have referred to genuine and finished instruments only; all rough abortions, make-shifts, and rudely-trimmed ponderous stones are omitted.

The most massive Palæolithic implement of which I have any note is in the Government Central Museum at Madras. It is made of quartzite, measures 9¾ inches × 5¾ inches, and weighs 6 lbs. 4 ozs. In fig. 1 I have engraved this implement, one-half actual size, from a drawing kindly forwarded to me by Dr. George Bidie. The cord-like band towards the top of the tool is a vein of white quartz. The next heaviest implement is the example found by the late Mr. J. W. Flower, at Shrub Hill (and which is now in the British Museum, Bloomsbury). This is made of flint, and its size is 11½ inches 5¼ × inches, and its weight (obligingly furnished to me by Mr. A. W. Franks) is 5 lbs. 7 ozs. The third heaviest implement of which I have a record (formerly 893 in my own collection) is a quartzite from Madras, procured through the kind aid of Dr. Geo. Bidie. It measures 9¾ inches × 5⅝, and weighs 4 lbs. 7¾ ozs. It is illustrated (one-half actual size) in fig. 2, and is now in the British Museum, Bloomsbury. Mr. Henry Prigg, of Bury St. Edmunds, has a specimen from Warren Hill, which weighs 4 lbs. 2 ozs.; and an example has been found in the Broom Pit, Chard, which is the same in weight. It is extremely rare to meet with implements which weigh 4 lbs. or over, and very seldom are examples found over 3 lbs. in weight. In the Exeter Museum there are, however, two examples from the Broom

Pit, made of chert, which measure respectively 9 inches × 5 inches and 9 inches × 5⅓, and weigh 3 lbs. 10 ozs. and 3 lbs. 8 ozs. An implement from Madras now in the British Museum, Bloomsbury (formerly 894 in my collection) measures 9 inches by 4⅝ inches, and weighs 3 lbs. 8¼ ozs.; and I still have an example from Madras (895) which measures 6⅞ inches × 5⅛ inches, and weighs 3 lbs. 6⅛ ozs. I have a rude implement found by myself at Warren Hill, Mildenhall, which weighs 3 lbs. 3¾ ozs.; another from Warren Hill (formerly 503 in

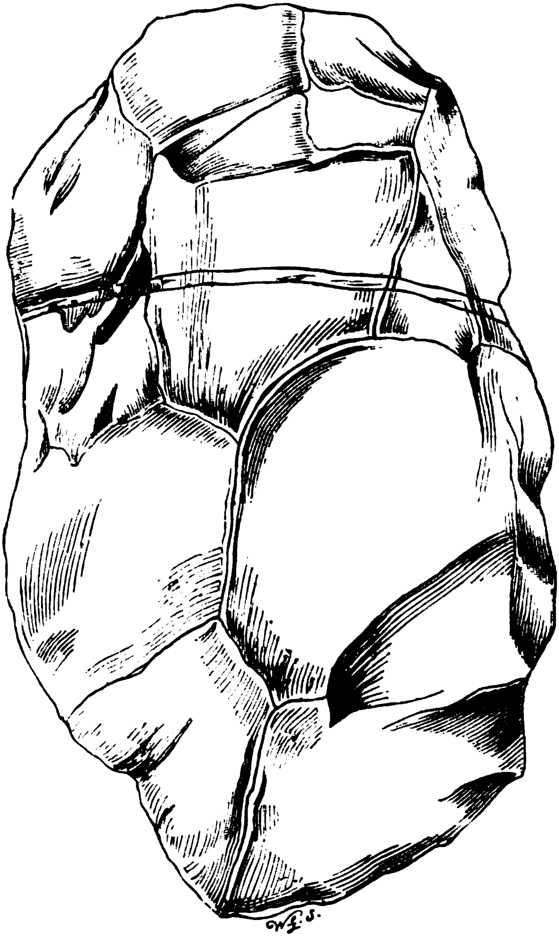

Fig. 1.—Palæolithic Implement from Madras (one-half actual size).

my collection) weighs 3 lbs. 2 ozs.; whilst one from the beach at Hill Head, Hants (formerly 648 in my collection), also weighs 3 lbs. 2 ozs. The two latter are now in the British Museum, Bloomsbury. The largest and heaviest implements found in the Valley of the Lea are now in the collection of Mr. J. E. Greenhill, of Clapton; the largest is from the Lea Bridge Road, and measures 11⅛ inches by 4⅜ inches, and weighs 3 lbs. Mr. Greenhill has a second implement from the Reighton Road, Clapton, which measures 8 inches × 4½ inches, and

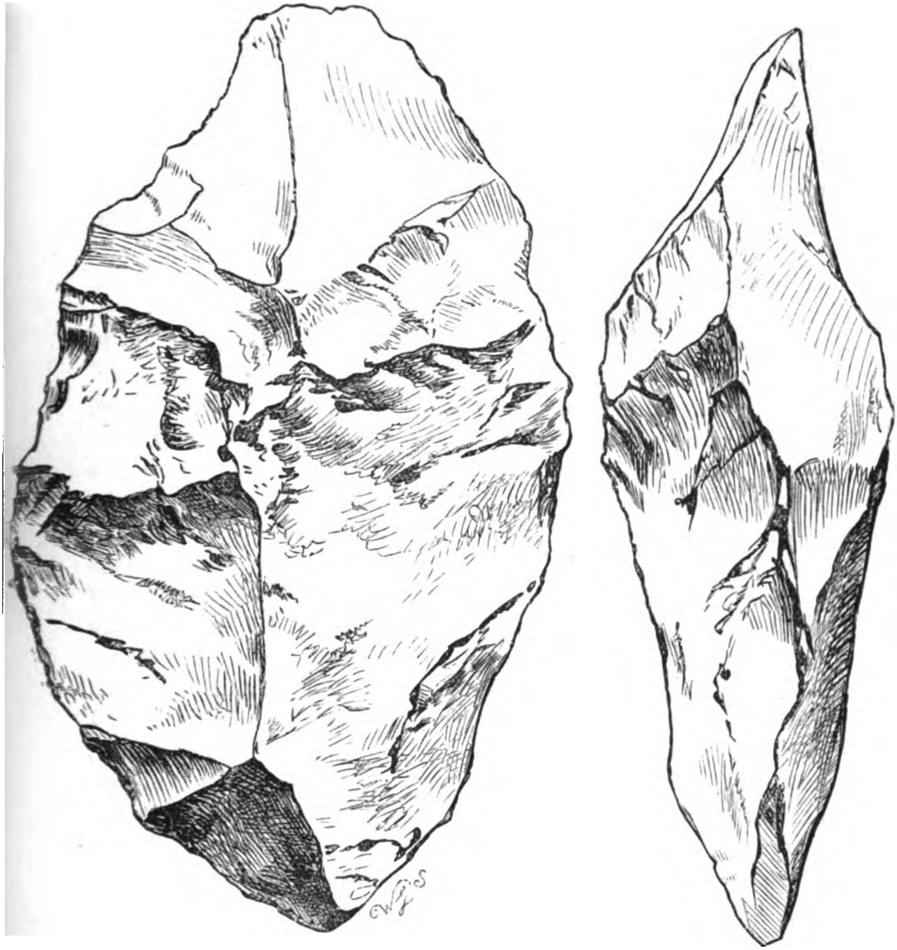

Fig. 2 —Palæolithic Implement from Madras (one-half actual size).

also weighs 3 lbs. A third implement in Mr. Greenhill's collection, found at Leytonstone, measures 8¼ inches × 4¾ inches, and weighs 2 lbs. 14 ozs. I have given an implement from Madras (formerly 842 in my collection), which weighs 2 lbs. 15¾ ozs., to the British Museum, South Kensington; and I have a similar Indian implement (296) which weighs 2 lbs. 15¼ ozs. One of my examples from the Lea Valley, illustrated in the "Transactions of the Essex Field Club" (vol. iii., p. 133), weighs 2 lbs. 13¾ ozs. I once found an implement at Bedford (formerly 569 in my collection) which weighed 2 lbs. 13½ ozs. Dr. John Evans now has this. I still have a trimmed flake (*i.e.*, a tool which is plain on one side, having been made from a flake), found by myself in a road at Clapton, and which weighs 2 lbs. 11¼ ozs. Mr. Greenhill has an implement from Stoke Newington Common which weighs 2 lbs. 9½ ozs.; and I have an implement from Chard (123) which weighs 2 lbs. 7¾ ozs.; one from the same place (455), which weighs 2 lbs. 5 ozs., is now in the collection of Mr. R. P. Greg, and one found by me at Hill Head (1019) weighs the same. I formerly had three implements from Madras (879, 898 and 844), which weighed respectively 2 lbs. 11¾ ozs., 2 lbs. 10¼ ozs., and 2 lbs. 8¼ ozs. The first is now in the collection of Mr. R. P. Greg, Coles Park, Buntingford; the next is in the British Museum, Bloomsbury; and the third I gave to Dr. John Evans. An example I found at Hanwell (81), and now in the British Museum, Bloomsbury, weighs 2 lbs. 4½ ozs., and one from Broom (457), now in the collection of Dr. John Evans, weighs the same. One found by myself on Stoke Newington Common (482), now in the collection of Dr. John Evans, weighs 2 lbs. 3½ ozs. One I found *in situ* at Lower Clapton (31), now in the British Museum, Bloomsbury, weighs 2 lbs. 3¼ ozs. I still have an example from Madras (900) which weighs 2 lbs. 2½ ozs., and one from Broom (105) which weighs 2 lbs. 2¼ ozs. Dr. Stephens has found an implement in the Reading gravels which weighs 2 lbs. 3¼ ozs., and Mr. Greenhill has an implement from Lower Clapton which weighs 2 lbs. 1½ ozs. I once found an implement at Stokes Bay, Gosport (704), given by me to Mr. G. F. Lawrence, which weighed 2 lbs. 1½ ozs., and two I found at Broom (194 and 65) weighed 2 lbs. ¾ oz. each; the former is now in the British Museum, Bloomsbury, and the latter is in the collection of Dr. John Evans. I formerly had an implement from the base of a 10-foot grave in the cemetery at Southampton (232) which weighed exactly 2 lbs. This instrument is now in the British Museum, Bloomsbury (1011), together with one found by me at Hill Head, which also weighs 2 lbs.

Implements weighing between 2 lbs. and 1 lb. are uncommon, but too much space would be occupied in giving an enumeration.

Butt-ends often give a clue to implements which were large and heavy when perfect. Amongst many other large examples I have a butt-end from Chard which weighs 2 lbs. 8¾ ozs.

Certain flakes also tell a similar tale of heaviness. Amongst a large collection of specimens, I have a ponderous outside flake from Madras, which is rudely trimmed to form a horse-shoe-shaped implement, and which weighs 3 lbs. 13 ozs.

The Madras implements mentioned above were all found by natives at a place near Tirupati, a town 83 miles from Madras, and a station on the N. W. line of railway from Madras to Bombay. The place is sometimes entered as Tripetty on the maps.

[We have pleasure in again acknowledging our indebtedness to Mr. Worthington Smith for the engravings illustrating the above notes.—ED.]

Lord Rayleigh at Cambridge.—On June 9th, at Cambridge, Lord Rayleigh, one of the Vice-Presidents of the Club, was presented for the honorary degree of Doctor in Science. The "Essex Times" thus alludes to the presentation :—"At Cambridge on Saturday, in the presence of the Prince and Princess of Wales and the Royal Princesses, honorary degrees were conferred on Prince Albert Victor and a number of distinguished men. Among these latter was Lord Rayleigh, M.A., F.R.S., upon whom was conferred the degree, *honoris causa*, of Doctor in Science. In the Public Orator's Latin presentment, Lord Rayleigh was welcomed to Cambridge, where he was lately so well known as Professor of Experimental Physics, and where his recent province of work, the Cavendish laboratory, was ever associated with the munificence of his grace the Chancellor. The Orator alluded to Lord Rayleigh's researches into the motion and resistance of fluids (especially in regard to drops and jets),to his explanation of the blueness of the sky, to his brilliant discoveries in optics and acoustics, and to the happy way in which he had shown that the same principle could often be applied to the elucidation of apparently diverse phenomena. He had a profound knowledge of mathematical theory with consummate skill as an experimentalist, as well as with that common sense which is proverbially so far from common."

Abnormal Deposit of Dew.—On Saturday, July 14th, I was surprised to find a heavy deposit of dew on the grass at noon and during the afternoon. I had previously noticed the entire absence of dew, but on walking through some thick grass about noon, I found large dew drops hanging from every blade near the ground. The weather had, as we all know, been unusually cold up to Friday, the 13th ; but on Saturday morning the wind sank, and we had an oppressively hot afternoon with thundery-looking clouds. The cause I presume was that the ground being colder than the air, the moisture condensed near the former, but I have never observed the phenomenon in the daytime before, and should be glad to hear if others have done so.—REGINALD W. CHRISTY, Boyton Hall, Roxwell, July 16th, 1888.

ON THE INTRODUCTION OF A NEW GAME-BIRD (THE *TINAMU*) INTO ESSEX; WITH SOME ACCOUNT OF ITS HABITS.

By J. E. HARTING, F.L.S., F.Z.S. (Member of the British Ornithologists' Union).

[*Read February 25th*, 1888.]

LITTLE more than a century ago the Red-legged Partridge was unknown in Essex; now, as every sportsman is aware, it is in many parts of the county quite common. In or about the year 1770,[1] several noble sportsmen appear to have combined in importing eggs from France, and hatching them out under hens on their estates in different parts of the country.

In East Suffolk the Marquis of Hertford and Lord Rendlesham turned out a good many at Sudbourn and Rendlesham; and Sir Harry Fetterstonhaugh, at Uppark, Sussex, reared several coveys from imported eggs in 1776.

In Essex the Earl of Rochford tried a similar experiment at St. Osyth, and in 1777 coveys were met with at Colchester, which had, doubtless, emanated from the last-named centre of introduction.[2] In the interval which has since elapsed, the bird has become thoroughly established. Some sportsmen aver that its introduction was a mistake, that its habit of running spoils the best dogs, that its quarrelsome disposition drives the grey partridge away, and that it is not to be compared with the latter as a bird for the table. In this view I cannot altogether agree. Every sportsman, of course, knows how these birds will run on being approached, and how sorely on this account they try the patience of men and dogs; but every experienced partridge shooter must also admit that when, later in the season, recourse is had to "driving," the red-legs show undeniably good sport. As to their drawing the grey partridges away, I have so frequently found them in the same field of roots, and have so often known them to lay in each other's nests, that the alleged antagonism of the two species cannot be so great as has been asserted. It is probably only in the breeding season that the cock birds are quarrelsome, driving the hens about as pheasants and black game will do. On the whole, therefore, while recognising the desirability of keeping down the number of these birds on the farms within reasonable limits, I would certainly not advocate, as some landowners do, an attempt to exterminate them by destroying every nest that is found. The pursuit of the red-legged partridge, whether by shooting over dogs in rough ground and large fields of roots, or by systematic "driving," calls forth as much energy and skill on the part of the sportsman as is required to circumvent any other game-bird in this country: on this account, therefore, it is well worth preservation. The list of English game-birds is not so full that we can afford to dispense with it.

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[1] Although the first systematic attempt to introduce the bird into England was made about this time, it was not actually its first appearance here, for so far back as the time of Charles II. (1660-1683) several pairs were turned out about Windsor, but were supposed to have perished (Daniel, "Rural Sports," vol. iii. page 94).

[2] See ESSEX NATURALIST, vol. ii. page 39.

Many years after the naturalization of the Red-legged Partridge, attempts were made to introduce another game-bird into this country, namely, the so-called American partridge, better known as the Virginian Colin, *Ortyx virginianus*. Numbers of this handsome little bird have been liberated in Norfolk, Suffolk, and Northamptonshire, but being bad sitters, and liable to desert their nests if disturbed, they have not answered the expectations formed of them, nor increased to the extent expected. I have not heard of any being purposely introduced into Essex, although it is not unlikely that wanderers from other centres of dispersal may have been shot in the county.

The latest attempt to introduce a new game-bird to English sportsmen has been made by Mr. John Bateman, of Brightlingsea, in this county, and the result of his experiment deserves wider recognition than it has met with. In this case the bird selected hails from South America, where it is known to English colonists and to Spanish-speaking sportsmen as *Perdiz grande*—the big partridge—to distinguish it from smaller species of the family to which it belongs. The term "partridge," however, is a misnomer, there being no true partridges, nor pheasants either, in South America. The Italian settlers on the River Plate call it *Martineto*. The native name for the bird in French Guiana is *Tinamu*, or to adopt the less correct French spelling, as given by Temminck, *Tinamou*,[1] the Latinised form for the generic name being *Tinamus*, and the specific name *rufescens*, from the rufous colouring of its plumage.

The name *Tinamu*, according to Professor Newton, first appears in print in Barrère, "Histoire Naturelle de la France Equinoxiale" (page 138), published in Paris in 1741, whence, in 1778, it was adopted by Buffon "Hist. Nat. des Oiseaux" (tome iv., page 502), and in 1790 was Latinised by Latham in his "Index Ornithologicus" (page 633).

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[1] No Spanish or Spanish-American word ever ends in *ou*; the *u* in South America has the sound of *oo* in English.

A South American correspondent of "The Field," writing with authority derived from personal acquaintance with the native haunts of this bird, states that the name is a corruption of the Guarani word *Inambu*; and Mr. W. H. Hudson, who is well acquainted with the species as inhabiting the Argentine Pampas, informs us that the Indian name for it there is *Melum*.

The Tinamus, says Mr. Wallace, are a very remarkable family of birds,[4] with the general appearances of partridges or hemipodes, but with the tail either very small or entirely wanting. They differ greatly in their organization from any of the Old World Gallinæ, and approach in some respects the Struthious or ostrich tribe.[5] They are very terrestrial in their habits, dwelling in the forests, open plains, and mountains of the Neotropical region from Patagonia and Chili to Mexico; but like the Cracidæ they are absent from the Antilles.

Their colouring is very sober and protective, as is the case with so many ground birds, the sexes being externally indistinguishable, and they are seldom adorned with crests or other ornamental plumes, so prevalent in the order to which they belong. The body is thick and the head small, the bill a trifle shorter than the head, gently curved and depressed, the tail small and often concealed by the coverts, the wings short and rounded. About 40 species are known to science at present, and these have been grouped in nine genera. According to Messrs. Sclater and Salvin the sub-families and genera are as follows:—Tinaminæ, seven genera; *Tinamus* (seven species), Mexico to Paraguay; *Nothocercus* (three species), Costa Rica to Venezuela and Ecuador; *Crypturus* (sixteen species), Mexico to Paraguay and Bolivia; *Rhynchotus* (two species), Bolivia and South Brazil to La Plata; *Nothoprocta* (four species), Ecuador to Bolivia and Chili; *Northura* (four species), Brazil and Bolivia to Patagonia; *Taoniscus* (one species), Brazil to Paraguay; Tinamotinæ, two genera; *Calodromas* (one species), La Plata and Patagonia; *Tinamotis* (one species), Andes of Peru and Bolivia.

Many of these birds are found only in forests, while others, on the contrary, frequent open grass lands, and have the habits of the European quail. They run with great rapidity, and seldom attempt to save themselves by flight, although, when flushed, some of the species can fly well with a peculiar whirring of the wings. Their intelligence appears to be of a low order, and when suddenly alarmed they seem stupified with fear. On such occasions, according to the observations of Darwin,[6] a man on horseback riding round and round them, so as to gradually narrow the circle, may knock over as many as he pleases; but the usual way to capture them is by means of a small lasso or running noose made of the pliant shaft of a Rhea's feather, fastened to a long wand; and a boy on horseback, thus provided, has been known to secure as many as forty in one day.

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[4] He treats them as a family of the order Gallinæ ("Geograpical Distribution of Animals," vol. ii., page 343); but those who adopt Prof. Huxley's classification, based upon the form of the palatal bone, would place them as Mr. Sharpe does in an independent order, Crypturi.

[5] In the form of the skull they approach the Ratitæ or ostrich tribe, while like all Carinate birds they possess a keel to the sternum.

The Tinamus are highly esteemed for eating, and on this account have been much persecuted; so much so, that, in some parts of South America, species which were once common, have now to be sought for at a considerable distance from their former haunts. The eggs of the different species of Tinamu are very peculiar in colour; some being of a purplish lead colour, others dark green, like those of the Emu; others again of a lighter pea green; the texture is smooth and glossy, and when once seen can hardly be mistaken for those of any other bird. Some interesting chemical researches in regard to these peculiarly coloured eggs have been made by Mr. Sorby (Proc. Zool. Soc., 1875, pp. 357, 361).

The particular species with which we are at present concerned is the "Rufous Tinamu," *Rhynchotus rufescens*, found in Bolvia and South Brazil to La Plata. The accompanying engraving from a drawing made from life, and kindly lent by the proprietors of "The Field," will give a better idea of its appearance than can be conveyed by a mere description. The bird is common in the plains of Buenos Ayres wherever long grass abounds, and is found southward to the Colorado. South of this river it is very rare, and disappears before the Rio Negro is reached. It finds no cover for concealment but the giant grasses through which it pushes its way like a rail.

Mr. W. H. Hudson, writing of this bird from personal observation of it in its native haunts (Proc. Zool. Soc. 1872, page 516), says:

> "It is solitary in his habits, conceals itself in the grass very closely, and flies with great reluctance. I doubt if there is anywhere a bird with such a sounding flight as this; and I can only compare the "whirr" of its wings to the rattling of a light vehicle driven at great speed over a hard road. From the moment it rises until it again alights, there is no cessation in the rapid vibration of the wings; but, like a ball

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[6] "Naturalist's Voyage Round the World," pp. 45, 113.

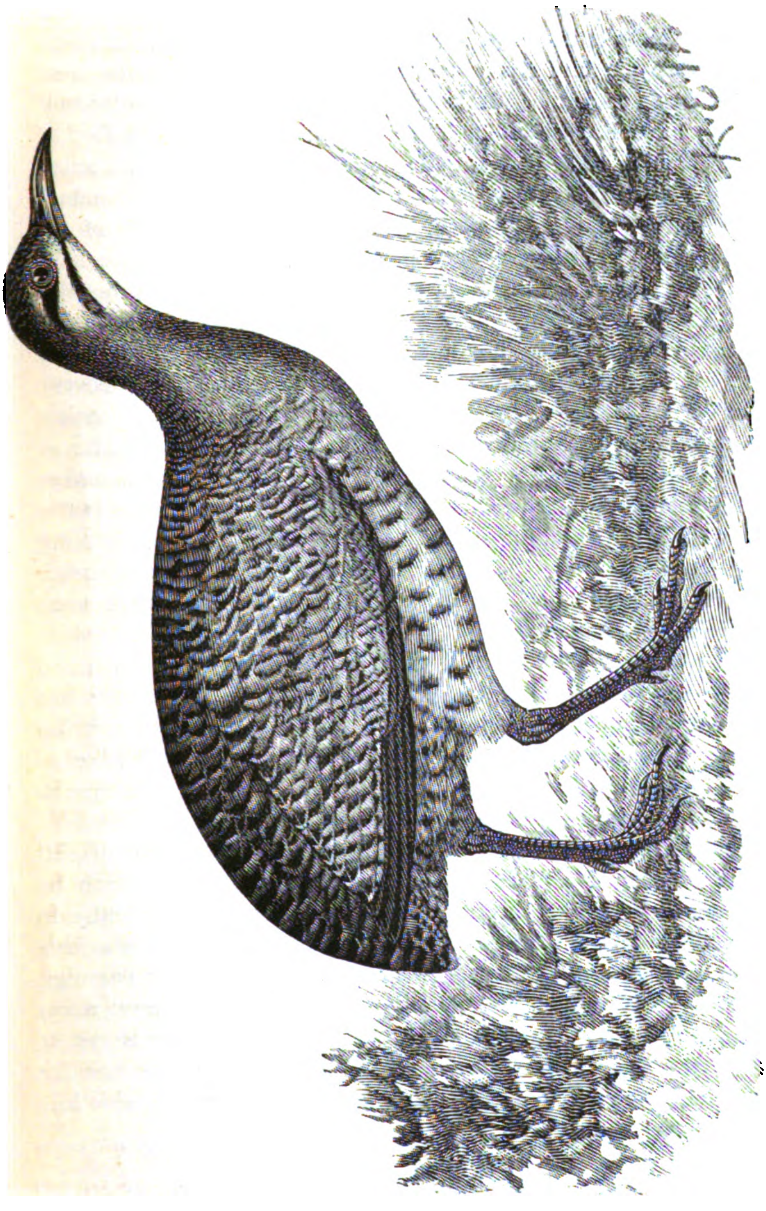
thrown by the hand, the bird goes gradually sloping towards the earth, the distance it is able to accomplish at a flight being 1,500 to 2000 yards. This flight it can repeat when driven up again as many as three times, after which it will rise no more. The call of *Perdiz grande* is heard at all seasons of the year; on pleasant days, and invariably near sunset, it is uttered while the bird sits concealed in the grass, many individuals answering each other: for although I call the *Perdiz grande* a solitary bird (they are rarely seen in company), several individuals are mostly found living near each other. The song or call is composed of five or six long notes, with a mellow flute-like sound, and so impressively uttered and sweetly modulated, that it is perhaps the sweetest bird music heard in the Pampas. It lays five large and almost round eggs of a dark wine purple colour."

The same writer, elsewhere referring to the development of instinct in young birds ("The Field," Oct. 9th, 1886), says:

"As we might have expected, the faculties and instincts of the young of this species mature at a very early period; when extremely small, they abandon their parents to shift for themselves in solitude; and when not more than one fourth the size they eventually attain, they acquire the adult plumage and are able to fly as well as an old bird. I observed a young bird of this species, less than a quail in size, at a house on the Pampas, and was told that it had been taken from the nest when just breaking the shell; it had therefore, never seen or heard the parent birds. Yet this small chick, every day at the approach of evening, would retire to the darkest corner of the dining-room, and, concealed under a piece of furniture, would continue uttering its evening song for an hour or more at short intervals, and rendering it so perfectly that I was greatly surprised to hear it; for a thrush or other songster at the same period of life, when attempting to sing, only produces a chirping sound."

In April 1883, Mr. Bateman, of Brightlingsea, imported half-a-dozen of these birds from Buenos Ayres, and placed them in an aviary. Unfortunately in the following June a dog got in and killed four; but not before 30 eggs had been laid. These produced some 20 chicks, half of which survived all dangers, of which the chief was being trampled under foot by their foster-mothers, the Essex hens.

In 1884 the stock still in confinement stood at thirteen head (namely, two of the original lot, and eleven reared), with a few at large in the parish. A friend at Buenos Ayres then forwarded three more, and three others were purchased from the Zoological Gardens. After this addition to the stock, eleven birds were turned out on Brightlingsea Marshes in April, 1885, and, with fourteen reared in confinement, increased to about fifty or sixty. During the spring and early summer of 1885, the musical notes of these birds might be heard in Brightlingsea and parts of Thorington. Mr. Bateman likens the notes of the cock bird to Ti-a-ú-ú-ú, and those of the hen to Ti-a-ú. He says the bird might be easily mistaken for a hen pheasant were it



THE RUFOUS TINAMU (*Rhynchotus rufescens*).

not for the absence of a tail, and cock and hen in this respect are alike. When flying, however, it is readily distinguished by the brick-red colour of its wings, as well as by the greater length of neck, and a trick the bird has when frightened of sticking up its crest feathers like a cockatoo. It is capital eating, more like a landrail than any other English bird. The flesh is quite white. The food of the Tinamu is somewhat varied; nothing comes amiss, field mice, sparrows (killed while trying to steal the Tinamu's food in confinement), corn, grass-seeds, bread, onions, thistle-tops, insects of all kinds, and roots of the arum and bluebell, the latter being especially liked. The eggs he describes as about the size of a hen's, but the colour that of a purple plum with the bloom rubbed off. In Essex, he says, it nests chiefly in the barley, wheat, or grassy hedgerows, laying from seven to ten eggs at a time, and sometimes (he believes) lays a second batch. The nest, hardly worthy the name, consists merely of a few grass straws in a standing crop of barley. So far as can be observed (whether tame reared or wild) the young manifest no disposition to remain with the mother, or foster mother as the case may be, but go in for wild independence from the first, chasing every insect they see.[7] The "clucking" of the hen does not attract them in the least, and, in a wild state, the parent bird is never seen with much of a following.

As to whether the cockbird alone incubates, as has been stated from observation at the Zoological Gardens, where this species has on several occasions bred,[8] Mr. Bateman hesitates to express an opinion, the fact being that externally the sexes are so much alike as to be indistinguishable, except at pairing time, or by the difference in their notes as already described.

After the covey of eleven birds had been turned out on the Brightlingsea Marshes, Mr. Bateman issued a printed notice in which he expressed a hope that his neighbours, and sportsmen generally in Essex, would refrain (at all events for a season or two) from shooting the birds should they wander off his land. Their greatest enemies, however, proved to be foxes, and to these wily poachers a great many of the birds fell victims. Mr. Bateman is too good a sportsman to destroy the foxes in his county, much as he desires to save his Tinamus, but he very naturally complains if hounds do not visit him and account for some of the foxes he has carefully preserved for them. When the coverts were shot at Brightlingsea in November, 1885, six foxes were unkennelled, and the following autumn four were "viewed away" in a day. In 1885 the hounds came once in February, and the following season they came once in March. Meantime Mr. Bateman had the mortification of seeing his Tinamus (imported with such trouble) gradually disappear until they were nearly exterminated. Eight were seen with a hen at Great Bromley in August, 1887. At the present time there are still a few in some neighbouring (and more or less *fox-less*) parishes, and Mr. Bateman has eleven in his aviary. These he intends to turn out this spring, and it is very much to be hoped that residents in the county will aid him as much as possible in carrying out another experiment. The elements of success lie in the fact that the Essex marshes approximate in character to the natural haunts of the bird, and sufficient natural food may be found there to support it. It is very hardy, and while the protective colour of its plumage favours its concealment, it flies well enough to escape from all natural enemies, except foxes; in this respect being no worse off than partridges or pheasants. Moreover, although liable to wander like other game birds, it is not strictly migratory like the quail, and may therefore be expected to remain throughout the year in localities which are fairly suited to its natural requirements. As to its protection by statute, as the law at present stands it would not come under the definition of "game," and consequently no penalty could be enforced for killing it out of season, It is to be hoped, however, that the good feeling of sportsmen would suffice to secure it from molestation during the breeding season, until such time as an amendment of the law might place it, if the experiment succeeds, on the same footing as other game birds.

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[7] One chick on the day of hatching made a regular crusade against the "black beetles" in the keeper's house.

[8] It bred eight times to the end of 1868. See Bartlett, P.Z.S., 1867, p. 687; 1868, pp. 114, 116; 1869, p. 628.

For the information which I am now able to lay before the society, so far as it relates to Essex, I am indebted to Mr. Bateman himself, who very kindly replied *seriatim* to a string of questions which I addressed to him. It seemed to me that an experiment of this kind, having for its object the introduction into this country of a new game bird, is not only of considerable importance to the community at large, but of special interest to the naturalists in Essex.

DISCUSSION.

After the reading of the above paper at the meeting of the Club on February 25th, 1888, the following remarks were made:—

The President (Mr. E. A. Fitch) in thanking Mr. Harting for a very interesting and apposite paper, made some remarks on the introduction of the Red-legged or French Partridge into Essex, at St. Osyth [see note in ESSEX NATURALIST, vol. ii., page 39]. The "Red-legs" had now become more abundant than the common partridge at St. Osyth. He thought, judging from what Mr. Harting had said, that there was a possibility of the Tinamu overcoming the dangers which confront every new denizen, and becoming a welcome addition to the game birds of Essex and East Anglia.

Mr. F. C. Gould said that as naturalists they would all welcome the new comer, but he was afraid that climatic influences would be against it. The Tinamu was also, he understood, a very silly bird, and it would therefore be easily caught or shot, and it had a decided taste for corn. It was spoken of as a "new game bird," but, of course, it was not legally included among "game," and Parliament would be very unwilling to increase the number of birds and animals protected by the game laws.

Mr. Harting said that the marshes in Essex approximated very closely to the natural haunts of the bird in South America. As to its taste for corn, that was probabably an acquired habit, and owed its origin to the fact that the young birds which had been turned out had been reared upon corn. The Tinamu could be protected by being included in the Wild Birds Protection Act. Seeing how hardy the bird is reported to be, he thought that a few experiments in the acclimatization of it deserved encouragement, and he hoped that those which had been turned down in Essex would be protected, or, at least, allowed to remain unmolested, so that they might have a chance of increasing.

Mr. T. V. Holmes asked whether the Tinamu was in anyway inferior to the Red-legged Partridge in activity or powers of flight. Remembering that the latter bird had apparently become thoroughly acclimatized, it was not difficult to realize the possibility of a like success with the Tinamu, provided its habits were such as would enable it to live in England.

Mr. Walter Crouch said that the general quail-like appearance of the bird was suggestive of its power of holding its own in England.

Mr. Greatheed enquired whether the Tinamu was a migratory bird.

Mr. Harting understood that it was an extremely active bird, and would fly a mile at a time. He thought that its chance of survival in England would be at least equal to that of the Red-legged Partridge. The Tinamu was not strictly migratory, though it wanders in its native haunts over a very considerable extent of country.

Mr. Fitch remarked that the migratory habit of the quail rendered its occurrence in any locality very vacillating. Some years ago quails were very common in Essex, but they were rarer now. He enquired whether the Barbary Partridge (*Caccabis petrosa*, Gmelin), had been seen in Essex.

Mr. Harting said that the records of the Barbary Partridge in England were very unsatisfactory. It was possible that in some cases the birds might have been introduced through their eggs having been imported with those of the Red-legged Partridge, which they much resemble. He would like to have information as to whether the Virginian Quail (*Ortyx virginianus*) had ever been turned out in Essex, and if so whether it had survived.[9] Such records would be very useful for the "Catalogue of the Birds of Essex," now being prepared for the Club by Mr. Miller Christy.

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[9] In the early part of this century several pairs of Virginian Quails were turned out in Norfolk by the late Earl of Leicester, but these, according to Mr. Stevenson in his "Birds of Norfolk,"

In reply to questions, Mr. Harting alluded to the protective colours and markings of quails and other land birds, referring to Mr. Wallace's opinions on this matter, and also to Mr. Hudson's remarks (in the Proc. Zool. Society, 1875) with reference to a South American Heron (*Ardetta involucris*), which is so wonderfully protected by the attitude it assumes, and the similarity of its markings to the herbage among which it dwells. Much of the indifference of the Tinamu to danger might be the result of inexperience; as soon as that had been gained they might look for a marked change in the habits and wariness of the bird. In reply to a question from Mr. White, Mr. Harting admitted that the young being able to imitate so nearly the notes of the adult was certainly curious, but they must recollect that the young were able to run as soon as hatched, and unless they possessed good vocal powers, they would, owing to the roaming nature of the adults, stand a chance of being lost, and so perishing from want of the old birds' care.

Scops Owl (*Scops Giu*) **and other Rare Birds in Essex.**—With reference to the specimen of the Scops Owl, shot by Mr. Wm. C. Emson, of Home Hall, Littlebury, near Saffron Walden, at Littlebury, on June 11th last, and briefly recorded by him in the "Field" of June 23rd, I have now obtained the following additional information, through the kindness of Mr. Emson, who writes me under date, July 4th:—"I cannot tell you much about the habits of the scops owl I shot, except that it made its home in Howe Wood—a large wood in the parish of Littlebury. It used to commence its plaintive cry about 8.30 p.m. Its cry somewhat resembled the loud croaking of a frog. The village boys tried to imitate it by crying 'chalk.' It could be heard more than half a mile off. It kept up its dismal noise the greater part of the night, keeping chiefly on the high elms about half a mile from the wood. The people got quite superstitious about it, having come to the conclusion that it was the 'Old One' himself, especially as it was shot at two or three times before being secured. Several of them asked me if I thought shot would enter it! I believe there was a pair of them at first, as I shot at one in the dusk one evening. It appeared to fall among some clover, and the boys ran to pick it up, but could not find it. This was the week before I shot the one I now have. I am rather confirmed in this belief by some of them saying they had heard two; and a neighbouring farmer says they have nested two years in succession in a rabbit's hole, about four miles from here, on the borders of Cambridgeshire, but have disappeared this year. The bird I have is a male. It took very little notice of my being under the tree, but it was almost impossible to see it perched, as it appears to conceal itself against a branch, all the while keeping up its cry, which seems to come from a place quite different from where the bird really is. I got a boy to climb the tree, and shot the bird as it flew away high up in the air. A good specimen of the Golden Oriole was picked up quite exhausted, last week, on an adjoining farm, in the parish of Elmdon. My brother has a pair of Hoopoes, one shot at Wimbish, the other at Horseheath, about two years ago. We have also a Honey Buzzard, trapped on an old wasp's nest, in the winter time, as well as a common Buzzard, taken in a baited trap last year. Nightjars nest with us every summer." It is difficult to give credence to the statement that the Scops Owl has bred near Littlebury for the last two years; some other bird must surely be intended.—MILLER CHRISTY, Chignal St. James, Chelmsford, July 7th, 1888.

have long since died out. Mr. Harting states in his "Handbook of British Birds," that in April, 1867, three males and four females were set free by H.R.H. the Prince of Wales at Sandringham, and that since then many others have been turned out in Norfolk and Suffolk. As bearing upon the problem of their chance of survival, Mr. Hancock may be quoted, who states ("Birds of Northumberland and Durham") that in the spring of 1872 a considerable number of the Virginian Colin were set at liberty on the banks of the Coquet, a little above Warkworth; several broods were reared the same year, and in 1873 they appeared to be going on favourably.—ED.

Carex Goodenovii, Gray.—On Saturday afternoon, June 9th, during the excursion of the Hackney Microscopical Society, I found at Woodford an interesting form of *Carex goodenovii*, Gray. It has the terminal spike androgynous, with male flowers at the base and apex. The specimen has been seen by Mr. Arthur Bennett, F.L.S., of Croydon, who says that this form of *C. goodenovii* is not at all common.—ROBERT PAULSON, Upper Clapton.

The Bee Orchis (*Ophrys apifera*) in Essex.—Some correspondence which has recently taken place in the "Essex County Chronicle" respecting the localities for this plant in Essex may be worth summarising. "W. B. L." records finding a specimen on July 15th on the railway embankment at Margaretting, and, in reply to enquiries, Mr. Edwin E. Turner, of Coggeshall, says that the flower is "generally to be found in several places on the lines of the Great Eastern Railway, with its companion plant, *Chlora perfoliata* (the Yellow-wort). The localities are: between Witham and Hatfield Peverel, at Stanway near Colchester, and also on the Woodford, Loughton and Epping line, between Epping and Ongar. I saw one specimen some years ago from a field near Marks Hall. Some years I have seen hundreds of spikes, but as the appearance of our orchids for some cause or other is very uncertain, it is often possible to search after it in vain; as, for instance, this year a solitary specimen was my only reward in several expeditions made for the express purpose of securing it." Mr. G. Alan Lowndes, J.P., of Barrington Hall, Hatfield Broad Oak, records finding a specimen "near Canfield Heart, on the roadside leading from Hatfield Broad Oak to Dunmow, and several specimens were found near Pawell's Farm, in this parish, by Miss Alice Mortimore, a very intelligent botanist;" while Mr. Thomas Spurgin, the Manor House, Ongar, gives a list of stations as follows:—"I have found it between Saffron Walden and Little Walden, between Little Walden and Hadstock, on the road between Saffron Walden and Strethall, between Saffron Walden and Ashdon, near St. Aylotts. Of late years I have found it abundantly in the grounds of Little Laver Hall, Ongar, sparingly in the lane leading from Berners Roding Hall to Willingale Doe; also between Willingale Spain (Radley-green) and Norton-heath, and abundantly on the railway embankment between Ongar and Epping, where, a week or two since, a party of friends and myself gathered some hundreds. Gibson, in his "Flora of Essex," records its being found near Littley Wood, between Wenden and Arkesden; near Bardfield, between Elsenham and Broxted; near Newport, between Henham and Chickney; at Halstead, Ballingdon, Great Leighs, Great Canfield, near Broomfield, Chelmsford; Fyfield, Writtle, near Epping, near Harlow, Purfleet, Kelvedon, Braxted, Rivenhall, Felix Hall Park (with white flowers), so that this curious flower is by no means uncommon in this country. In a collection of wild flowers at our Horticultural Show, on July 18th, were several fine specimens of the Bee Orchis gathered near here." In the new edition of the "Flora of Hertfordshire" many localities are given, but the plant appears to be everywhere rare in that county.—ED.

"Danes" or "Denes."—"This valley [the "Valley of Rocks" on Exmoor] or 'goyal' as we term it, being small for a valley, lies to the west of Lintor, about a mile from the town perhaps, and away towards Ley Manor. Our homefolk always call it the 'Danes' or the 'Denes'; which is no more, they tell me, than a hollow place, even as the word 'den' is." From "Lorna Doone: a Romance of Exmoor," by R. D. Blackmore.

Protection of Pallas's Sand Grouse.—At a meeting of the Norfolk and Norwich Naturalists' Society, held in the Museum on the 29th of May, a letter was read from Mr. Geoffrey Buxton, in which he desired to bring before the meeting the question of the preservation of the Sand Grouse. After referring to the recent immigration of these birds, Mr. Buxton said it would be a grievous pity that they should be so entirely destroyed as they were in 1863, and expressed a hope that if preserved they might become indigenous to this country. After some discussion, it was resolved that letters, signed by the President, should be addressed to a number of the principal landowners in Norfolk, urging them to afford protection to these interesting birds.—[*Communicated by* MR. J. H. GURNEY.]

EMISSION OF SCENT BY A DELTOID MOTH.

By Prof. RAPHAEL MELDOLA, F.R.S., F.E.S. (Vice-President of the Essex Field Club).

THE possession of distinct structures for the secretion and diffusion of scent by Lepidoptera was first pointed out by Fritz Müller in the case of certain South American butterflies. Ten years ago I had the privilege of making known the results of his observations at a meeting of the Entomological Society of London (Trans. Ent. Soc., 1878, page 211; also Proc. Ent. Soc., 1878, pp. 2 and 27). The wing-pouches, talc spots, fan-like tufts, etc., found in many Lepidopterous insects perform the functions referred to; and, with reference to the secretion of odoriferous products by these insects, it must be borne in mind that two distinct purposes may be served, viz., the production of a nauseous smell to act as a signal of distastefulness, or the emission of a fragrant odour to serve as a sexual attraction. In the first case the odour is of the same use as gaudy coloration, and in the second case it is analogous to that emitted by the males of certain animals during the breeding season. It is obvious that scent-organs which perform this second function are of the nature of secondary sexual characters (in the Darwinian sense), and it is accordingly observed that they are usually possessed by the male only, and when present in both sexes are very generally more fully developed in the male than in the female. The differences between the structure and functions of the two kinds of organs and the odours emitted by them have been fully described by Fritz Müller in his various papers on the subject, and there is no occasion to recapitulate them here.

In the notes to my translation of Weismann's "Studies in the Theory of Descent" (vol. i., page 103), I called attention to the well-known presence of fan-like tufts in certain British moths, and suggested that they were also scent-organs. One of the species mentioned, the common *Herminia tarsipennalis*, takes its name from the possession of such fans on the front legs, the fact that these structures are present *in the male only* being strongly suggestive of the view that they are secondary sexual characters. This suggestion which I made in the work referred to I am now enabled to confirm by a direct observation made yesterday (July 19th, 1888) in Epping Forest.

I had caught and bottled a specimen of this moth, and when apparently dead had removed it from the cyanide bottle and pinned it into a box. On opening the latter some time afterwards the insect had recovered and was fluttering on the pin, the fans being then folded and hardly visible. On giving the moth a pinch under the thorax in order to kill it the fans were suddenly thrust out and expanded, and it instantly occurred to me that the opportunity had arrived for testing the truth of the view which I had long held but of which I had hitherto obtained no direct evidence. I lifted the moth by the pin and immediately smelt it, when a strong odour of jargonelle pear was perceptible. I passed the insect without delay to my friend Mr. E. Boscher, who was with me at the time, and he also distinctly recognised the smell. The satisfaction of thus verifying an idea which had been dormant for six or seven years will be appreciated by readers of the ESSEX NATURALIST. I may add that the odour disappeared in the course of a few minutes.

This observation seemed to me of sufficient interest to be placed upon record. Not only does it confirm the suggestion as to the functional value of the organ in question, but it gives a hint which is not without value to physiology, with respect to the nature of the odoriferous product. The odour perceived is a very familiar one to chemists, and is well-known to pertain to amyl acetate, this ether being used for the preparation of artificial pear essence. As far as odour can be taken as a test of identity, I should certainly have no hesitation in expressing the belief that the scent diffused by this little deltoid moth is amyl acetate.

Food of the Ring-Dove (*Columba palumbus*).—On May 10th I shot a ring-dove whose crop contained no less than 1,840 green seed-pods (with the calyx attached) of *Veronica buxbaumii*. It is interesting to note the variations in the diet of this voracious bird. A week or two ago their favourite food was the shoots of peas, especially the sweeter kinds grown for picking; before that they had to content themselves with the leaves and crowns of white and red clover, double handfuls of which might be taken out of some of their crops. In the winter their food consists largely of turnip-tops, cabbage, kohl rabi of which they are very fond, ivy berries and the small tubers at the root of *Ranunculus ficaria*. They also glean the stubbles and young clovers for corn shelled out in harvest time, and I have counted 620 kernels of barley in the crop of a ring-dove shot off a clover ley in midwinter. In a few weeks they will begin to eat the flower heads of charloch (*Brassica sinapis*), and they have already attacked the seeds of the witch elm (*Ulmus montana*). In the autumn they swallow acorns and cram their crops so full of them that on falling to the ground they burst and scatter the acorns all around them. Ring-doves are becoming one of the greatest of nuisances to the farmer, doing even more damage than rooks.—REGINALD W. CHRISTY, Boyton Hall, Roxwell.

A Bee's Nest in a Jacket Pocket.—A man named Gill, employed at Foote's Farm, Great Burstead, held by Mr. Philip Cole, recently found that a bee had domiciled itself in the pocket of his jacket which had been hanging in a shed upon the farm. The pocket also contained a piece of honeycomb and a large number of cocoons from which the young bees were just emerging.—"Essex County Chronicle," July 27th, 1888.

THE ESSEX FIELD CLUB.

Visit to Colchester, Lexden, Layer Marney, etc.

May 19th to 21st, 1888.

It would be quite unnatural in any Society having for the scene of its activity the greater part of the ancient Kingdom of the Trinobantes, to neglect Colchester, the earliest town in England to which authentic history attaches; which is rich in associations, legendary, archæological and historical of all periods—Celtic, Roman, Saxon, Norman and Modern—and which contains so many records in earth, pottery, brick, and stone, of local and even of our national history. Four years ago the Club had a very successful meeting in the town and neighbourhood, visiting Mersea, and many of the most striking scenes of the havoc wrought by the great Earthquake of April 22nd, 1884. This year, largely aided by the kind exertions of our Vice-President Dr. Laver, and our members, the Rev. C. L. Acland, Mr. J. C. Shenstone, and Mr. W. H. Harwood, the Secretaries were enabled at Whitsun-tide to arrange a second visit to Cunobelin's "royal town." The above named gentlemen, with our worthy President, Mr. Fitch, acted as conductors at the meeting, and the thanks of the Club are due to them for their efforts in its interests.

Excellent arrangements had been made at the "Cups Hotel" for the accommodation of members from the Saturday to the Tuesday, and many availed themselves of this opportunity to make a somewhat longer visit — travelling down to Colchester on the Saturday afternoon. The evening was spent in an examination of the Castle, Museum, and other objects of interest in the town. On the following morning the train was taken to Thorington, where the White Climbing Fumitory (*Corydalis claviculata*) was gathered, and so on to Brightlingsea (noticing *Ruscus aculeatus* by the way), where the Church of "All Saints" (a building of great interest, chiefly early perpendicular work, about 1400) was attended. Near the Church *Salvia verbenaca* (Wild Clary) was growing commonly. The nearest localities mentioned by Gibson are Harwich and Mersea, at which latter place Mr. Shenstone has gathered it, but this is the first record for Brightlingsea. Another plant gathered, not recorded for this locality by Gibson, was *Carduus marianus*, abundantly. The Milk-thistle is not indigenous, but is now cultivated in gardens for the sake of its ornamental foliage, which when young makes a nice salad. Also *Fœniculum vulgare* (Fennel), mentioned in the "Flora of Essex," as occurring in several places, but Mr. Shenstone had been unable to find any records for this locality since the book appeared. Other plants noticed were *Lamium amplexicaule* (Henbit), *Lactuca virosa* (Acrid Lettuce), *Fragaria vesca*, and *Borago officinalis*, etc.

Advantage was taken of the ferry to visit St. Osyth. On the way many insects were noticed, and some photographs were taken by Mr. Greatheed. The pretty little butterfly, *Thecla rubi*, was flitting about the brambles in numbers; an Emperor Moth (*Saturnia carpini*) dashed wildly by the hedgerow, and the charming "Wood-lady" butterflies (*Anthocaris cardamines*) were flying leisurely in the lanes. The little bronze-coloured "Long-horned Moths" (*Adela viridella*) made a pretty sight, hovering over the bushes in swarms, with *Bibio*-like flight, in full enjoyment of the bright sunshine. Mr. Harwood looked after the bees, and other insects were also collected. At St. Osyth the entomologists under Mr. Harwood's guidance found plenty of mild excitement in the somewhat difficult search for the hybernated larvæ of the "Essex Emerald Moth" (*Phorodesma* *smaragdaria*), on the Sea-wormwood (*Artemisia maritima*). About a dozen caterpillars were found, but all agreed that they required looking for, so well adapted for concealment is their habit of covering their bodies with fragments of the food-plant.[1] Many "nests" of the young larvæ of the "Coast Lackey Moth" (*Bombyx castrensis*) were also seen on the *Artemisia*, and a few other interesting larvæ were noticed, such as *Cænonympha pamphilus*, *Aspilates citraria* (since bred by Mr. Fitch), and *Myelois cribrum* in the thistle stalks. Among the plants noticed on the "Saltings," was *Suæda fruticosa* (Shrubby Seablite), decidedly a local species.

The party then walked back to Thorington to catch the 7.3 train to Colchester, as advertised in a local paper, but to their chagrin the newspaper time-table was found to be a "delusion and a snare," the only evening train having left an hour and a half previously. There was nothing to be done but to walk seven miles along the line into the town, where they arrived weary, dusty, foot-sore and late for dinner!

Nothing daunted, the "house-party" was up early on Monday morning perambulating the circuit of the Town Walls under the guidance of the President. The walls of the ancient Colonia appear to be purely Roman work, and have been assigned by Dr. Duncan to a date as far back as the second colony in Britain (about 65 A.D.). They are built of the masses of *septaria* from the London Clay of the Essex coast, with alternating courses of Roman tiles, cemented with the imperishable mortar, the secret of which was so well-known to the Romans, but which our modern builders strive hopelessly to imitate. The walls as they now are, stand at an average height of ten feet; their circuit is about 3,100 feet, and they enclose a space of about 100 acres; altogether they are the most perfect remains of the kind in the kingdom, and it is earnestly to be hoped that every effort will be made to preserve intact such a noble specimen of Roman architecture.[2]

The main party arrived at Colchester at about 11 a.m., and an assembly was soon called in the Keep of the Castle, where Dr. Laver acted as conductor, and pointed out the main features of this most interesting building and gave a sketch of its history. The Castle stands about the middle of the town, and immediately within a rampart of earth of irregular pentagonal shape, which is probably of earlier date than the building itself. The plan of the Keep is similar to that of the White Tower of London, and most antiquaries now consider the building to be of Norman age, although much controversy has arisen on this point, some contending for a Roman origin—an opinion apparently mainly based on the fact that Roman materials were largely employed in its construction. If the Normans were the builders it is the largest Keep of that age in England (being double the size of the White Tower), "with the stern simplicity of its architecture enriched by the bands of deep red tiles and cream coloured stone in its walls, and internal arrangements for convenience and comfort beyond those which were usual at the time."[3]

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[1] The majority of these larvæ were entrusted to Mr. White's care, but with the exception of two which were preserved in the larval stage, all died before pupating. On July 21st, Mr. Fitch bred from his larva, a ♂ Moth. At the Meeting of the Entomological Society on June 6th last, Mr. White exhibited these preserved larvæ, and made some remarks concerning the so-called "case," which the insect is said to construct from portions of its food-plant. This he did not consider to be really a case, but he had discovered that the larva possessed on its segments certain secretory glands, at the apex of each of which there is a bristly hair; this appears to retain pieces of the plant, which are probably fixed firmly afterwards by means of the secreted fluid. These pieces are very irregularly distributed, and their purpose is evidently protective. Our readers will find a sketch of the history of the moth in the Essex Naturalist, vol. i., pp. 120 and 204.

[2] See Dr. Duncan's monograph (Trans. Essex Archæol. Soc., vol. 1); and Duncan's "History of the Walls of Colchester, 1855," and "Quarterly Review," xcvii (1855) etc.

Some time having been spent under Dr. Laver's guidance in examining the castle, the Rev. C. L. Acland (*Hon. Curator, Essex Archæological Society*) took the party in charge, and pointed out to them some of the more interesting specimens in the MUSEUM, which is now housed in the chapel of the castle. The collections are the joint property of the Corporation of Colchester and the Essex Archæological Society, and deserve to be better known than they are; they are of great interest in many departments. The museum owes its origin to the bequest to the town by its former mayor, Mr. Henry Vint, of his fine collection of bronzes, aided in 1861 by the purchase by the Essex Archæological Society (and private subscribers) of the Acton collections, subsequently by the donation of Colchester antiquities to the Corporation by Mr. Taylor, and of a large number of lesser presentations from time to time. The principal portion of the collection consists of *local* Roman remains of almost every kind. Many of the specimens are probably unique.[4] Prehistoric antiquities of many types are well represented. There are many very excellent local specimens of various kinds of stone implements, and also a variety of types from other parts of the world, and Mr. Acland is constantly endeavouring to add to this department. A few small adze-shaped tools from Burmah form part of the only collection as yet known from that country, where the prevalence of a comparatively high native civilization of probably very ancient date pushes back the "Stone Age" to a remote antiquity. Two or three implements, found on the northern shores of Lake Superior, are of *pure copper*, and are interesting as having, among others, led Dr. Schliemann to modify the opinion he expressed in his work on the excavations at Troy that the implements there found by him were the only specimens in pure copper that had been discovered. These North American axes are probably fashioned by hammering from some of the virgin copper, which is frequently found in large masses in that locality, and of which a very fine specimen may be seen in the Yelloly Watson Collection of minerals in the corridor.

A small but interesting collection of antiquities from very early Peruvian grave-mounds deserves more notice than we are able to give it. The specimens, found in mounds of dry sand parallel with the coast, which were laid open by the earthquake wave in 1868, are probably relics of a race that had passed out of memory before the coming in of the Incas. The climate of that part of Peru being absolutely dry, all perishable articles—hair braid, fishing lines, wooden utensils—are just as perfectly preserved as the stone arrow-heads, earthenware whorls, and pottery of the collection.

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[3] It would be manifestly quite useless to attempt any description of this grand building within the limits of a report of a Field Meeting. Fortunately, quite a literature exists on the subject, and the reader may be referred to Mr. Buckler's "Colchester Castle, a Roman Building," (1876) for an exposition of the Roman theory of the Castle, and to "The History and Antiquities of Colchester Castle" (Colchester, 1882) for a learned statement of the Norman side of the controversy and citation of authorities. Many valuable papers will also be found in the Essex Archæol. Society's Transactions, and in the "Archæological Journal," while the history of the building is well summarised in Mr. Cutt's volume on Colchester, in Freeman's "Historic Town" series, recently published.—ED.

[4] It was long a reproach to Colchester that its antiquities were habitually sold out of the town, and public and private museums all over the country have been enriched with the treasures of Colonia. One of the most zealous collectors was the late Mr. William Wire. Mr. Roach Smith, in his "Retrospections," thus writes of him :— "He had great perseverance and intelligence, but he failed to find favour with the leading townspeople, and, in consequence, masses of choice antiquarian material were lost to science, for very many were carried to distant parts, never again to be heard of. Some ornamented Roman leaden coffins, which, through his agency, could easily have been secured for the museum, were melted. In his letters he ever complained of the treatment he experienced, adding, that but for me and Prof. Henslow, he should have long ceased to collect. Mr. Acton, of Grundisborough, was one of the chief purchasers of Colchester antiquities." As above stated, the Acton collections have since been restored to the town.—ED.

One case contains portions of very large rude but ingeniously-made urns of coarse pottery, found locally, the style and manner of ornamentation of which suggest that they may be of the period of the chambered cairns of North Britain. We have no stone in Essex, so that chambered cairns would be an impossibility with us; but these urns exactly resemble those described and figured in Anderson's "Rhind Lectures," found by him and others in the wonderfully-constructed cairns of Caithness and elsewhere in the far north.

Mr. Acland pointed out the progress he was making in getting together series of specimens illustrating the development and variation from rude types of objects of domestic and social use—a subject in which he takes great interest, and which is so thoroughly worked out in General Pitt-Rivers' magnificent collection, now at Oxford.

Natural history is not a prominent feature in the museum, and, indeed, is somewhat incongruous with the avowed objects of the Essex Archæological Society. The local specimens are very few in number. Close to the entrance is a case illustrating oyster culture and growth—from the first fall of the spat to the time when the bivalves are ready for the market. One specimen is remarkable and puzzling. A good sized crab was taken alive—on his back are oysters not less than six or seven years old. They were alive also at the time the crab was taken, and it is quite evident, therefore, that this particular crab, contrary to the usual habit, had not changed his shell for at least six years.

The corridor contains the collection of shells given to the Corporation by the late J. T. Ambrose, of Mistley, which were arranged by Dr. Bree, and the Yelloly Watson series of ores and minerals, both of which are well worthy of examination, but they are, of course, not of a local character. The latter collection is specially good. It contains specimens of the ores of various metals as they appear in the market. They are arranged in accordance with the plan adopted at the Museum of Practical Geology in Jermyn Street. Mr. Yelloly Watson's position in the mining world gave him unusual facilities for getting the specimens, and he took great pleasure in increasing this collection, so as to make it as perfect as possible.

In a room below the general level of the museum is a large and varied collection of remains of Crag mammals, all dredged up in the North Sea. They were got together by the late Dr. Bree, and several of the specimens are of greater interest to the local naturalist than the other portions of the museum.

As Mr. Acland said, the museum is sadly in want of increased space and increased funds so as to allow of the expansion of the collections, which could be readily made if these necessary conditions were existent. If any funds had been available for the purchase of such finds as have been brought to light in the course of the last fifty years, Colchester Museum would have had the finest collection of Roman antiquities in the country. Such, however, has not been the case, and many museums, public and private, with their specimens from Colchester, bear witness to the fact. It is much to be feared that Mr. George Joslin's unique gathering of antiquities illustrating the religious, social, and domestic life of the colonists of Camulodunon during four centuries of Roman occupation, will be allowed to pass away from the town and county to which it should certainly belong, owing to the difficulty of raising the money necessary to secure it. But it would be not too much to say that if such a disaster were allowed, it would be nothing but a lasting disgrace to the flourishing town of Colchester; the inhabitants have here already provided for them a solid nucleus of a museum, and it only needs a little energy, generosity, and perseverance to expand it into one of the finest accumulations of local antiquities extant in the country.[5]

But little time remained before luncheon to view other parts of the town, but Dr. Laver managed to conduct members of the party to the principal buildings mentioned in the programme. Some portions of the wall were visited, particularly the main or Prætorian Gate, known as the "Balkern" Gate, a word of unknown derivation; according to Mr. Cutts the gate was sometimes called in mediæval documents Colkyng's (King Coel's) Castle. The central arch eleven feet wide, and the two smaller side entrances, protected by a boldly projecting semicircular bastion, within which are two guard-rooms, were pointed out and explained by the conductor, while the botanists of the party amused themselves by gathering specimens of the Evergreen Alkanet (*Anchusa sempervirens*) growing there, which, if the plants are truly wild, is a station not recorded by Gibson. Other places visited by some members were St. Botolph's Priory, built before 1107, and after the dissolution of the monasteries used as a Parish Church until it was destroyed by the Parliamentarians during the memorable siege of Colchester in 1648. The west front of this building, with its early interlaced arches, has a very pleasing effect. The only portion of St. John's Abbey remaining is the gateway. Previous to its restoration by the Government (whose property it is), there were numerous marks of the cannon shots fired against it by Fairfax's soldiers, and it is much to be regretted that these interesting stigmata have now disappeared in the process of "restoration." In a vault under the north aisle of St. Giles's Church, hard by, lie the bodies of Sir Charles Lucas and Sir George Lisle, the defenders of Colchester in the King's cause during the siege; and the admirers of faithfulness and chivalry will read with some emotion, how, on the 28th of August, 1648, for their "eminent loyalty to their sovereign," these two "valiant captains" were, by command of Sir Thomas Fairfax (in defiance of all the usages of warfare), "in cold blood barbarously murdered."[6] They were shot in a green spot by the north wall of the castle, and for long afterwards, as De Foe ("Tour through Great Britain," 1724) and others wrote, "the inhabitants had a tradition that no grass would grow upon the spot where the blood of these two gallant gentlemen was spilled, and they showed the place bare of grass for many years."

The Saxon Tower of Holy Trinity Church is of especial interest to antiquarians, and attention may be drawn to the curious but characteristic western doorway. The "decent basin" used to collect alms in this church is an ancient wooden "Mazer" (Dutch *maeser*, maple) with silver-gilt rim, etc., which was figured and described by Dr. Laver in the Essex Arch. Trans. (n.s., vol. iii., 76).

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[5] So far as we know only one catalogue of the Castle Museum has been published, that issued in 1863, which is very meagre and imperfect (a second edition with two additional pages, and six plates of objects in the museum from the skilful pencil of the late Mr. Parish, appeared in 1869). An elaborate catalogue has since been compiled by Mr. J. E. Price, F.S.A., which is illustrated with comparative notes, drawings and engravings, but from want of funds this important work still remains in MS.

[6] It is traditionally said that the Duke of Buckingham, who had married Fairfax's daughter, finding that this epitaph reflected upon his father-in-law's memory, applied to Charles II. to have it erased. Whereupon the king mentioned it to Lord Lucas, who replied that he would readily obey the king's command provided his majesty would be pleased to permit him to replace it by a statement that "Sir Charles Lucas and Sir George Lisle were barbarously murdered for their loyalty to King Charles I, and that his son King Charles II. had ordered this memorial of their loyalty to be erased." In answer, the king ordered the inscription to be cut as deep as possible.

Inside the church is a tablet to the memory of the learned Dr. William Gilberd (or Gilbert) physician to Elizabeth and James, one of the heralds of the dawn of philosophy; he was born in Colchester in 1540, and lived and was buried there. He wrote principally on the properties of the magnet, and was the first to use the word "electricity." His works prove that his knowledge of electricity was superior to anyone for many years after his time. It will be remembered that Prof. Silvanus Thompson read a paper before the Club last year on Gilberd's life and works, which is now being prepared for publication in the ESSEX NATURALIST (see E. N. i., 94). It should be noted that this church (and in fact all old buildings in the town) is largely constructed of Roman building materials, and that it (in common with many other buildings in Colchester) was considerably shaken and damaged by the earthquake in 1884 (see "Report on the East Anglian Earthquake of April 22nd, 1884. Essex Field Club's Special Memoirs," vol. i.).

At half-past twelve all returned to the "Cups Hotel," where luncheon was served, and during which Mr. G. F. Beaumont "exhibited" (in the physicians' sense of the word) a large supply of that notable Essex fruit—the "*D'Arcy Spice Apple.*" Mr. Beaumont and Dr. Laver were full of praises of the excellent qualities of this apple. It is of medium size, and from greenish brown ripens autumnally into a red tint; it can be preserved in capital condition for the table if kept in the dust in which grapes are imported. It probably takes its name from the D'Arcy family, by whom it may have been introduced into this country from France, or else from the fact that it thrives best in the district around Tolleshunt D'Arcy, Essex.

After luncheon the main party, under the leadership of Dr. Laver, was driven by Lexden and Stanway to Layer Marney and Copford, but owing to some mis-direction two or three of the carriages went astray, and the errant travellers only reached Layer Marney in time to take part in the visit there.

The great lines of EARTHWORKS at Lexden and Stanway, which run from the river Colne on the north to the Roman River on the south, have long attracted the attention of antiquaries. In devising hypotheses to account for their existence, writers appear to have fallen into error by not clearly distinguishing the remains of Roman roads from entrenchments which are probably of earlier date. It is now generally conceded that the most westerly earthworks are the remains of the ancient boundary of the British *Oppidum* of Camulodunon.[7] The evidence of the Itineraries of Tacitus, and above all of the actual British and Roman remains, indicates that the site of Camulodunon was at or near Colchester. Possibly at first it was a mere fastness for occasional refuge in times of danger, answering to Cæsar's description of a British town (as a place with a tangled wood round it, and fortified with a rampart and a ditch), but with advancing civilization it assumed more the character of a permanent settlement, until it became the "royal town" of Cunobelinos (the Cymbeline of Shakespeare), and afterwards the Colonia of Claudius. "The place which is thus identified as the ancient fastness of the Trinobantes" (writes Mr. Cutts in his recently published volume on Colchester) "is bounded on the north and east by the river Colne, on the south by the smaller stream which has the significant name of the Roman River, and these natural defences are completed on the west by the ancient earthern ramrart, called Grymes Dyke, which runs across Lexden Heath from the Colne to the Roman River, about two miles distant from the point where they unite. This tableland, defended by its rivers and rampart, and surrounded by forest, corresponds very exactly with Cæsar's description of a British Oppidum, 'fortified by nature and art.' When we look for evidence of its British occupation, we do not fail to find them. The rampart which forms its western boundary, with a ditch on its west side, is the ancient boundary of the manors, parishes, and liberties of the borough—*i.e.*, it existed before manors, parishes, and borough. The earlier antiquaries mention flint spear-heads as being found in the neighbourhood of the rampart; weapons of flint and bronze, urns, and British coins, have been found in abundance scattered over the large area which we assume to be the Oppidum. A short distance within the rampant there is a lofty tumulus, which is probably British. Three British roads are to be recognised as converging within this enclosure: one towards London, another towards St. Albans, and another north-eastward towards the country of the Iceni. If these seem to be scanty relics of a long British occupation, it may be noted that the extant relics of the Saxon occupation of the same site during four centuries are still more scanty."

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[7] "The locative occurs on coins as Camuloduno. *Dunon* is the word which makes *din*, a fortress or town, in Welsh, and the whole name seems to have meant the town of Camulos, who appears as one of the gods of Gaul."—Prof. Rhys, "Celtic Britain."

In demonstrating the most interesting points in connection with the earthworks, Dr. Laver was careful to distinguish those banks which he considered to be the remains of old Roman roads from the true ramparts raised to defend the ancient British colony (see Dr. Laver's important paper on the Roman roads of the Colchester district, Trans. Essex Archæol. Society, vol. iii. (n.s.), 123). The first entrenchment visited was that on the east side of the valley in Lexden Park, and which crosses the road just before Lexden Church is reached. It commences at a point on the *old* Roman road to London, about one and a-half miles from Colchester, and extends northwards across the river Colne and railway to the Bergholt road, where it becomes very indistinct, but Dr. Laver believes that sufficient traces remain to allow its course to be followed in an almost direct line to Horkesley Causeway, an unmistakably Roman road. This entrenchment was said by the Rev. Henry Jenkins ("Archæologia," xxix., 243) to be the eastern boundary of British Camulodunon, and in this he has been followed by later writers; but Dr. Laver pointed out that the ditch was on the *inside*, a fact alone sufficient to show the erroneousness of such an idea, and he thought the work more like the remains of a road, especially as it crossed the river at a ford still in use. Dr. Laver drew attention to some tumuli in Lexden Park, and stated that excavations in these had shown that they contained Roman interments, many of the vases so found being now in the Museum. The party then drove to Lexden Heath, where Dr. Laver pointed out the traces of the early road towards Stanway, fully described in the paper above referred to, and showed that a foot-path, the descendant of the right of way, still ran over its course.[8] Then the remains of a second entrenchment, running a few yards from the "Straight-road," as it is called, on Lexden Heath, were visited, and it was stated that this earthwork commenced in the middle of one end of a small camp, plainly distinguishable; that it crossed the before-mentioned "old London road"; and that the traces were lost just at the starting point of the present Colchester and

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[8] In a very interesting paper "On the Antiquity of Some Foot-paths" (Trans. Essex Arch. Soc., vol. iii (n.s.), 78), Dr. Laver proves, from instances around Colchester, that numbers of our foot-paths follow ancient and sometimes forgotten lines of road, and are of very great antiquity, if not pre-historic in some instances, owing their existence to times when the rights of ownership were not such as we recognise at the present time.

Cambridge road. Dr. Laver suggested that this was probably the commencement of the Roman road which is well-known to have run between these towns, but the course of which can only be traced distinctly in Essex as far as Ridgwell. The next entrenchment visited was Grymes Dyke, running from the Colne at a ford near New Bridge Mill, Bergholt, to another ford on the Roman River, near Stanway Hall, where it disappears. It is now covered with trees, and the ditch converted into a sunk bye-road for some distance. This entrenchment, forming the boundary of the borough of Colchester, the parishes of Lexden and Stanway, and the manor of Stanway, was, Dr. Laver suggested, the western boundary of British Camulodunon, the other boundaries being the Roman River and the Colne (see *ante*), and he said that if this were so, it was easy to understand the necessity for the large army (of 30,000 men at least) which the Roman commanders brought against the important British stronghold when it was besieged and taken by Claudius. Dr. Laver further pointed out that Grymes Dyke in all probability was adopted also by the Romans as the western boundary of their colony of Camulodunon, inasmuch as east of it Roman remains abound, but that outside the rampart, on the west, no relics, or next to none, of that age have been found.

Way was made through pleasant lanes, from whence could be seen many attractive woods bordering the distant fields, then over the Roman River and so by the scattered village of BIRCH, where there is a heronry (to be described in Mr. Fitch's forthcoming paper on "Essex Heronries"); and where near the church is a large *Mound* with a trench, popularly stated to have been the site of Birch Castle, built by the Garnons in Norman times, but which is probably of earlier date, and which may have some connection with the entrenchments on Lexden Heath. Thence to the village of LAYER MARNEY, where, at "The Tower," the members were most kindly received by Mr. and Mrs. Maclean, who had provided an excellent "afternoon tea" for their refreshment. Dr. Laver was assisted in the task of demonstration here by Mr. A. B. Mitchell, of Clapton, whose measured drawings and sections of Layer Marney Tower and House obtained the second silver medal of the Royal Institute of British Architects in 1886. These drawings were reproduced in the "Builder" for April 3rd and 10th, 1886, and in the former part of that journal is a carefully written description of the buildings, sketch of the history of the Marney family, etc., with figures of the brasses, arms, etc., to which the reader is referred (and also for additional details to Park's "Domestic Architecture.")

LAYER MARNEY HALL was built about 1506 by Sir Henry Marney, 1st Lord Marney, K.G., Captain of the Guard to Henry VIII., and it is, perhaps, as good an example as exists of the English country mansion at the time when it was passing from the castellated to the domestic stage. It appears never to have been finished as originally designed. The great gate-tower, which rises to a height of nearly seventy feet, forms an imposing object when viewed from the south, and from its roof can be obtained fine views over the estuary of the Blackwater and surrounding country, with the sea in the distant horizon. It consists of a central block of three stories in height, flanked on either side by an octagonal tower on the south, and two square turrets on the north. These towers are again flanked by smaller semi-octagonal turrets, some seven feet less in height than the principal ones. The great four-centred archway on the ground-floor gave access to the courtyard within, and in the north-western turret is a fine wooden newel staircase from which all the rooms are approached, and on the principal landing of which is a door of communication with the only perfect part of the courtyard buildings still remaining.

Dr. Laver and Mr. Mitchell called special attention to the curious structural details of the tower, and to the ornamental designs in *terra-cotta*, which was plentifully used in the building, and which affords one of the earliest examples of the influence of the Italian Renaissance on architecture in England. The brickwork is of a deep red colour diapered with diagonal patterns in blue vitrified bricks. Mr. Mitchell was of opinion that the bricks were made on the spot, as the soil is heavy and clay abundant, and in a field to the south-west of the tower there is a hollow which has all the appearance of an ancient brickfield. But two of the beautiful carved brick chimneys now remain; many were standing in 1884, but were shaken down by the earthquake on the 22nd April of that year. The towers suffered a great deal in other ways, many of the roofs being injured, and some o'd fissures in the walls, previously scarcely noticeable, became at once alarmingly apparent.

By the kindness of the Rector, the Rev. H. J. Boys, and under his superintendence, a visit was then made to LAYER MARNEY CHURCH, dedicated to the Virgin Mary, which closely adjoins the Tower. The greater portion of the building appears to be of the same date as the Hall, having probably been rebuilt or greatly enlarged by the Marneys early in the 16th century. The fine rood-screen, the alabaster tomb of Sir William Marney (1414), and the very beautiful *terra-cotta* base and canopy of the tomb of Lord Marney, with its Purbeck marble effigy, all bear witness to the former importance of the church. There can be little doubt but that this latter elaborate tomb was the work of the same hand that modelled the ornamental parts of the grand gateway to the Hall. The roof of the aisle was anciently covered with lead, but the metal was sold by the church-wardens during the civil wars to make bullets. In the church is a Latin memorial to Nicolas Corsellis, one of the later owners of the lands thereabouts, in which there is an assertion that one "Corsellis, an Hollander (at the royal request and induced thereto by encouragement), taught the English the admirable art of printing. In the mercantile way he was noted to the farthest Indies. He is now an inhabitant of heaven. His virtue and fame still live." But the story appears to rest upon the slender foundation of a statement by Richard Atkyns in his work on printing, published in 1664, which can hardly be considered authoritative.

A hearty vote of thanks to Mr. and Mrs. Maclean for their hospitable reception of the meeting was proposed by the President, Mr. Fitch, and warmly seconded by Dr. Laver, who expressed his great gratification in finding that this grand old place, which he remembered well since he was a boy as a scene of utter neglect, had at last come into the possession of one who understood its value, and took such care in its preservation. Mr. Maclean expressed in a few words the pleasure it had given him and Mrs. Maclean to welcome the Club, and added that, although the great and costly work of restoring the Tower substantially was one he could not himself undertake, he might assure those interested that during his occupancy it should not become worse, but rather better, than he found it.

Quitting this antique retreat, the carriages were again entered, and the horses, heads turned north-ward to COPFORD, where, under the kindly guidance of the Rev B. Ruck-Keene, the very curious little church was visited. In some respects the church is one of the most remarkable in the county. The walls of the nave are of very great thickness, with Roman tiles built into them; this portion is usually considered to be of Norman age, but some have not hesitated to assign to it an earlier date, and even call it the remains of a Roman *basilica*. The chancel has a remarkable apsidal termination, with massive Norman buttresses, and Norman windows. About 1690 the church was repaired, and upon scraping the walls as a preparation for the white-wash, beloved of churchwardens, paintings of Christ, Mary Magdalen, etc., were discovered, but were of course whited over again. In restoring the chancel about 1884, a highly interesting and valuable discovery of religious art decoration was made. The decorations cover the whole of the apsidal chancel; they were very skilfully restored by Mr. Daniel Bell, and the Essex Archæological Society had drawings made of the whole, which still await publication. Under the soffite of the chancel arch is the *zodiac*, a similar example of which occurs in Salisbury Cathedral and in a very few other churches. On the ancient door one of the members of the party detected a small fragment of *skin*, and in the vestry the rector showed a larger piece which he had taken off the door some time ago. This skin was undoubted *human*, and similar remains have been discovered at Hadstock and at Worcester Cathedral. The fragments afford grim evidence of the reality of the punishment of *flaying* for sacrilege in former times, and the skin was traditionally said to be that of a marauding Dane, whose hide was tanned and nailed on the Church-door as a warning to like evil doers.

The Hall closely adjoining the church was pointed out as somewhile the residence of the notorious Bishop Bonner, and it is even said that he planted the shady walk of trees leading to the church.

Thanking the rector warmly for his kindly aid, a rapid drive back to Colchester was made, and the party was soon engaged upon a substantial tea at the "Cups Hotel," preparatory for the evening meeting which was held in the large room of the inn. Many members and friends had brought specimens, and quite an interesting exhibition of local natural history, etc., was the result.

At the commencement of the proceedings an ORDINARY MEETING (the 90th) was held, Mr. E. A. Fitch, President, in the chair. The following were elected members:—Dr. S. Hahnemann, Rev. Lancelot L. Sharpe, B.D., Messrs. J. D. Cooper, F. Finch, C. F. J. Jennings, and Frederick Watkins.

Mr. G. F. Beaumont exhibited an adult human skull, a cinerary urn, four beads of red earth ornamented with green and yellow (the ornamentation of two of them consisting of an encircled snake) a large amber bead, a cross-shaped bronze fibula, an iron buckle and an iron knife-blade or spearhead, all of which he believed to be of Saxon date. These remains were exhumed by Mr. Beaumont in the south corner of a field situate near the river bridge at Kelvedon, and numbered 7 in the Ordnance Survey map for Inworth Parish. M. Beaumont remarked that, although the ground had been levelled and there were no external signs of barrows, he had ascertained from an old survey (A.D., 1758) that the field was called "Barrow Field" and the lane running along its south-west side bore the significant name of "World's End Lane." The fields numbered 436A and 437 (Ordnance Survey map, Feering Parish), and which adjoin No. 7 (Inworth Parish) towards the north, are known as "Barrow Hills." A great many antiquarian articles similar to those exhibited were found in this locality some years ago, notably in the disused gravel pit, No. 9, Inworth Parish map, but unfortunately they have for the most part either been destroyed or lost. Mr. Beaumont announced that he had decided to hand his exhibits to the Essex Archeological Society for the Colchester Museum.*

In the course of a conversation on these remains, and others which had been found in the same place, Dr. Laver said that he thought they were Saxon and of very early date. The teeth in the skull were worn down as was usual in early times, owing to imperfectly ground corn upon which the people fed.

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* Mr. Beaumont has been followed in his explorations by Mr. Hills, Jun., of Prested Hall, Feering, and this latter gentleman has recently disinterred many skeletons and a fine collection of urns, fibulæ, beads, a bronze ring, knives, a sword, etc. Mr. Hills has been good enough to send us an account of his finds, and we trust that they will be carefully preserved, and, if necessary, described by some specialist.—ED.

The Rev. C. L. Acland exhibited a series of specimens from Brandon in Suffolk, illustrating the manufacture of gun-flints, and stated that the "tinder-box" was still used in many parts of Great Britain. He considered that many of the so-called "scrapers" of Neolithic age, were really "strike-a-lights" for use with nodules of iron pyrites—a mode of obtaining fire, which was quite easy in practice.

Mr. Shenstone before addressing the meeting on the "Flora of Colchester," said that he had frequently when away been condoled with on the flat and unpleasant character of their Essex scenery, but he hoped that the photographs exhibited that evening by Mr. Gill and himself would go some way to dissipate this notion. He also exhibited under the microscope many species of Foraminifera, which had been got out of oyster mud procured from a fisherman at East Mersea. Mr. Shenstone then went through the specimens of plants collected during the meeting, and also showed a long series of rare and local plants of the district from his herbarium, making interesting running comments upon each species. (See Mr. Shenstone's "Report on the flowering Plants growing in the neighbourhood of Colchester," ESSEX NATURALIST, i., 22.)

The President, in expressing the obligations of the meeting to their "Botanical Conductor," said that Mr. Shenstone was apparently the only active local botanist who had contributed to the ESSEX NATURALIST—but such a good example should stimulate other members of the Club to work in this direction.

Mr. W. H. Harwood exhibited his fine collection of the Aculeate Hymenoptera of the neighbourhood of Colchester, and also many interesting Lepidoptera, including a magnificent series of *Phorodesma smaragdaria.* He said that a few years ago his acquaintance with Entomology was rather narrow, and he was almost under the impression that the genus *Crabro* had something to do with the Crustacea. He had been shocked out of his indifference by a brother entomologist inquiring with contempt, "Do you know nothing of Entomology beyond moths and butterflies?" and thereupon he set to work to learn something of other orders of insects. The boxes exhibited showed what he had been able to do with the Aculeate Hymenoptera of the district. [Mr. Harwood then gave a sketch of the structure and habits of this division of Hymenoptera, which includes bees, wasps, ants, etc., and made comments upon the more interesting specimens in his collection. He is now engaged upon a paper on the Aculeates of the neighbourhood, which will be ready, we understand, for one of the winter meetings of the Club.] With reference to *Phorodesma smaragdaria,* he knew that it occurred only in that neighbourhood, but he would not go into the question of precise localities. Some time ago one caterpillar only had been found near St. Osyth, but it was not known what it fed upon. Mr. Buxton had the original specimen, and for long afterwards as much as £7 would be paid for a single moth. Some time ago an Essex entomologist asserted that if fed upon *Artemisia maritima,* a plant upon which he for one had never thought of looking for it. The first time he (Mr. Harwood) went after the larva he found numbers, and since then it had been found all round the district. He was afraid it would not be found much longer, if the present method of collecting were persisted in. London collectors cut off and tore off bushels of the food-plant, put the spoil up in a sack, and when at home waited until the larvæ crawled to the glass at the tops of their boxes. [A sketch of the history of the moth in Essex, by the Editor, will be found in ESSEX NATURALIST, i., 120.]

Mr. Acland spoke of a worse case, also that of a London collector, who not only used to cram his sack in the manner described, but would destroy the remainder of the plant as far as he could for fear other people should find the larvæ.

Mr. W. White said that the feeling of the Club on the subject was well known, as they had discussed that matter some years age, and they most emphatically condemned such selfish and unworthy conduct.[10]

Mr. Fitch said that he had been most anxious to find the insect in his own neighbourhood (Maldon) where there was a good extent of sea-wall, but hitherto his efforts had been unsuccessful.

Votes of thanks to the Directors of the meeting brought the business of the evening to a close. Many of the members had to leave early in order to catch the return train to London, but others remained at Colchester until the Tuesday morning.

[We have to acknowledge the aid afforded in compiling the above report by Rev. C. L. Acland, Mr. Fitch, Dr. Laver, and, particularly, by Mr. Greatheed who took short-hand notes of the evening meeting after our departure to catch the return train. We have also gratefully to acknowledge the courtesy of Mr. C. Edwards, the manager of the "Cups Hotel," who did all in his power to ensure the comfort of the members.—ED.]

FIELD MEETING AT LAINDON HILLS, Saturday June 9th, 1888.

(In conjunction with the Geologists' Association.)

" * * * * *

A sput suppass'd by few,
Where toddlers ollis haut to eye
The proper pritty view;
Where people crake so ov the place,
Leas-ways, so I've hard say;
An' frum its top yow, sartenly,
Can see a monsus way.
'Bout this oad Hill, I warrant ya,
Their bog it nuver ceases;
They'd growl shud yow nut own that it
Beats Danbury's an'to pieces."—CHARLES CLARK.

THE opening on June 1st, of the new line of railway from Barking to Pitsea having made Laindon Hills much more easily accessible than they were when the old line to Southend *via* Tilbury was alone available, this excursion of the two societies was very numerously attended. About ninety members and friends were present in spite of the unfavourable weather, which, in addition to being showery, gave little promise of the extensive panoramic views mentioned in the programme, which result from the position of Laindon Hills as an outlying patch of Bagshot Beds in the middle of a London Clay district.

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[10] As an indication of the lengths to which this rage for mere collecting is carried, we may mention that while writing the above report we received a letter from a friend who is staying in the New Forest and who writes, "* * * * I met a couple of entomologists (?) one of whom told me that butterflies were common, and that he himself had taken 500 *Limenitis sybilla* this season! I expressed some astonishment as he appeared to be a gentleman, and asked how he could possibly exchange so many? But he told me he did not exchange; he was getting material *for a design* in butterflies. I subsequently saw the same individual (with an assistant) taking *Catocala promissa* off the sugar, and he proudly produced a store-box containing over a hundred specimens of the 'Crimsons.'" This is as bad as some of the exploits of that miserable animal the battue shooter, and all naturalists and naturalists' clubs should join in repudiating such a gross sacrilege of nature.—ED.

The meeting was announced as under the directorship of Mr. Whitaker, F.R.S., and Mr. Walter Crouch, F.Z.S., but owing to Mr. Crouch's sudden illness on the day, the onus of conducting the meeting fell upon our honorary member, Mr. Whitaker. It is only just also to record the great assistance rendered by Mr. T. V. Holmes, who, in conjunction with Mr. Crouch, visited the spot previous to the meeting, and drew up the programme.

At Laindon Hills Railway Station the attention of the party was directed to the deep boring which was being made for a well in order to obtain a supply of water from some water-bearing bed below the impervious London Clay which there forms the surface. Mr. Legrand, the gentleman superintending the execution of this work, was purposely present at the station and kindly gave much information about this boring. From him we learned that the depth then reached was 444 feet. And from his remarks, and from samples of the material brought up from various depths, we ascertained that the uppermost 342 feet of the boring were in London Clay. Immediately below the London Clay were :—

Light coloured sand with shells	1 ft.
Pebbles	2 ,,
Light coloured sand with shells	21 ,,

And the beds below a depth of 366 feet, were all more or less sandy. Mr. Legrand also stated that the nodules of Septaria found in London Clay were the only sources of difficulty to the borer in that formation.

Leaving the railway the party turned southward and ascended Laindon Hills, whose summit is about a mile away. On reaching the top the party was conducted for a distance of some two or three hundred yards along the road which ranges in an easterly direction towards Dry Street and Vange, to a spot where, on the northern side, there is a pit showing twelve feet or more of Bagshot sand below three or four feet of loamy material. Here a heavy shower of rain fell, and Mr. Whitaker, looking down on the umbrellas of his attentive audience, discoursed on the geology of Laindon Hills, and the surrounding district. At the Railway Station (he said) they had learned that the thickness of the London Clay was 342 feet. Here the surface of the ground was more than 100 feet higher than at the station, and as the beds were lying nearly flat, they would have to add some 100 feet to the thickness pierced at the station to obtain the full amount for the London Clay of that district. The sand before them was certainly Bagshot sand, and in all probability Lower Bagshot. If anyone present thought it Middle or Upper Bagshot, he would remind that person that with the maker of that assertion lay the *onus probandi*, the natural presumption being that it was Lower Bagshot. Above this sand they saw a few feet of loam, and in the surface workings at the top of the hill, near the "Crown" Inn, they had seen gravel, the exact age of which was doubtful, though it was certainly of later date than the beds before them.

The rain having ceased the party then retraced its steps a few yards and walked through Coombe Wood, reaching the road to Horndon-on-the-Hill, a few yards south of its junction with that leading to the old church. On the eastern side of the Horndon road the gravel capping the hill has been much excavated. Examination of one of the deepest of these sections—none of which are of any great size—showed, below pebbles in a very sandy matrix, sand like that seen in the pit just visited. Mr. Whitaker and Mr. H. B. Woodward were, consequently, inclined to think that though there might be some ancient drift gravel (like that at Shooter's Hill and elsewhere) on the top of Laindon Hills, yet that there seemed to be no need to assume the existence there of other pebble beds than those of Lower Bagshot age. And it may be well to give here, in order to illustrate the character of the Lower Bagshot Beds of this district, the details of a section at Brentwood six or seven miles away, from Mr. H. B. Woodward's Geology of England and Wales (page 440).

Lower Bagshot Beds...	Pebble-beds	15 feet
	Brick-earth or loam and sand	25 ,,
London Clay	Brick-earth or loam and clay	50 feet
	Sand, 2 or 3 feet	
	Brick-earth or loam	
	Clay with *Septaria*	

This section affords a good illustration of Mr. Woodward's remark, that in sections near Brentwood the London Clay is seen to pass upwards into the Lower Bagshot Beds. Curiously enough copies of the older map of the Geological Survey of the district (1 S.E. without drift) show the Lower Bagshot pebble-beds, whilst the later edition, with drift, shows Pebble Gravel on the summit of Laindon Hill.

"Laindon Hills" is now the accepted spelling of the name of this parish, but it is still frequently called Langdon Hill, and this is probably the correct way, as it is no doubt derived from lang-don—the long hill. It is called Langdon Hill by Morant, and in the Geologically-coloured Ordnance Map, but not in the later Ordnance maps.

Few heights in the south-east of England equal Laindon as a spot from which the physiography of the surrounding district can be explained. On a clear day the spectator is enabled, by slightly shifting his position within a circle having a radius of about two hundred yards from the crown of the hill, to see for a considerable distance in every direction. Eastward are the ridge on which Hadleigh and Rayleigh stand, the flats of Canvey Island, and the cliffs of Sheppey. Southward are the Kentish villages of Cliffe and Cooling, and the long dip slope of the North Downs. Westward the most conspicuous object is Shooter's Hill, while the northward view is bounded by the high ground between Brentwood and Danbury. And the broad Thames, besides forming an extremely obvious topographical guide, adds to the scene an element of beauty often wanting in extensive panoramic views, especially in this part of England.[1] It was, doubtless, this possession of all the elements necessary to form a perfect landscape that caused Morant, the county historian, to describe Laindon as commanding the finest views in Essex, if not in England. And we have more unbiassed testimony in a work entitled "A Six Week's Tour through the Southern Counties of England and Wales" (Lond. 1768). This book, which Mr. H. B. Woodward had brought with him, and which was stated to be written by the "Author of the Farmer's Letters," was identified by Mr. Cole as a work of the well-known Arthur Young. As might be expected, the writer treats mainly of the agricultural condition of the various counties visited, though he by no means ignores either the beauties of Nature or those of Art.[2] His journey into the Laindon district seems to have been extremely unpleasant. He remarks that "of all the cursed roads that ever disgraced this kingdom in the very ages of barbarism, none even equalled that from Billericay to the King's Head at Tilbury." This road seems to have been not only extremely narrow, but full of ruts of "incredible depth"; in addition he was perpetually meeting with chalk waggons, themselves stuck fast. Yet, he adds, "a turnpike was much solicited for by some gentlemen, to lead from Chelmsford to the Ferry at Tilbury Fort, but opposed by the Bruins of this country, whose horses are torn to pieces with bringing chalk through those vile roads. I do not imagine that the kingdom produces such an instance of detestable stupidity; and yet in this tract are found numbers of farmers who cultivate above £1,000 a year."[3]

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[1] A small engraving, "Scene from Laindon Hill, the property of Mrs. S. Hatton," was published in 1832 in the "Beauties of Essex." It was drawn by W. Bartlett, and engraved by H. Wallis.—Ed.

[2] Mr. Holmes has compiled an epitome of the most interesting observations of Young, so far as they have reference to our county, which we hope to print ere long in the Essex Naturalist.—Ed.

But his excusable indignation at the state of the roads did not prevent him from admiring the views from Laindon Hills, of which he thus writes:—"I forgot to tell you that near Horndon, on the summit of a vas hill, the most astonishing prospect that ever was beheld by human eyes breaks almost at once upon one of the dark lanes. Such a prodigious valley, everywhere painted with the finest verdure, and intersected with numberless hedges and woods, appears beneath you, that it is past description; the Thames winding through it, full of ships, and bounded by the hills of Kent. Nothing can exceed this amazing prospect unless it be that which Hannibal exhibited to his disconsolate troops when he bade them behold the glories of the Italian plains! If ever a turnpike should lead through this country, I beg you will go and view this enchanting prospect, though a journey of forty miles is necessary for it. I never beheld anything equal to it in the west of England, that region of landscape."

During the French Invasion scare of 1803, beacon fires of straw faggots and tar barrels were made ready on the tops of the hills of Laindon, Danbury, Purfleet, etc., and farmers around were requested not to burn weeds for fear of false alarm. Laindon' Hill was especially a marked spot, Marshal Saxe having asserted, many years before, that with 10,000 men he would hold it for six weeks against any enemy.

Though our journey of 40 miles from London to Laindon and back was quick, easy, cheap, and luxurious to a degree that, if foretold to Arthur Young, would have seemed to him wildly Utopian, the weather prevented us from enjoying anything that could fairly be called an "enchanting prospect," and consequently from getting much physiographical instruction from the views. We had in addition to lament the unavoidable absence of Mr. Walter Crouch, as mentioned above, and the loss of the notes on the chief points of archæological and historical interest in the surrounding district, which he has kindly promised to furnish. The places he had intended to mention are all easily seen from Laindon, on a clear day. We may hope, however, to be more fortunate as regards both circumstances on some future occasion.

Under the guidance of the Rev. Alfred Poole, the Rector, and Mr. S. W. Squier, J.P., we next visited the old church, now used only as a mortuary chapel. It is on the west slope of the hill, below the Rectory, and embowered as it now is among the trees, it forms with its wooden spires and porch, a very picturesque object. The dedication is to St. Mary the Virgin and All Saints, but the present structure is not of great antiquity. The church consists of a nave, chancel, and an additional chapel, opening from the chancel on the north side, with two arches, supported by a central octagonal pillar. This addition was made in 1834 by subscription, and at the time foundations were discovered indicating that a side chapel had anciently existed on the site. The nave and chancel are built of hard red-brick, and the east window, of three lights, is carefully moulded in these and super-mullioned. The chancel was rebuilt 1621, and the initials of the churchwarden of that period R.E. 1621 (Robert Elleitt) may be seen on the north wall over the pillar. The nave was rebuilt 1666, and this is recorded by the following inscription in iron Roman letters "THOMAS RICHARDSON. JOHN ELLEITT, 1666," on the north wall.

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[3] It is asserted, as an explanation of the bad roads of former times in Essex, that the farmers chose not to invite, by providing goods and easy means of travelling, the prying visits of their non-resident squires and rectors, to look after rent and tithes:—

> "They wor fine times for farmers then, and fine goin's on too,
> One crop o' mustard ud buy the land wi'out much ado.
> Landlords and rectors they was birds o' which you only heard,
> They'd send for rent or tithe, but twarn't often they appeared;
> For that matter the tenants didn't werry much wish they should,
> *And they kept the old roads most as bad as ever they could.*"
>
> "The Old Essex Clerk."—Ed.

The pretty timber spire and bell-turret was renewed in 1842, the cost being defrayed by a church rate of five shillings in the pound, which Mr. Squier said was paid to the last penny. The parishioners appear to have been always extremely loyal, and over the entrance to the chancel is a large painting of the Royal Arms, in distemper, with an appropriate text in black letter with red initials:—"My son, fear thou the Lord and the King, and meddle not with them that are given to change.—Prov. xxiv. 21. John Elliett, churchwarden." This was doubtless put up as a memorial of the restoration of Charles II., and, as Mr. King says, it is also interesting as a "late example of decorative wall-painting, however incongruous the substitution of the lion and unicorn for Jesus in Glory and the Final Doom which anciently occupied the position in many churches." Another inscription, which also reflects the loyalist traditions of the place, is to be found on a slab partly within the Communion rails, and which is quaint enough to merit reproduction:—

> "Beneath this stone lie treasured up the reliques of Thomas Richardson, late of Clement's Inn, gentleman. One whose but half-spun time was rightly fraught with the accomplishments becoming a man, who in these late unhappy times, when tyranny had usurpt the throne, and schism too farre prevailed in this pulpit so justly steered 'twixt each extreme, that when death came to take him hence, with joy he could (which few can) truly say that soverainety knew not a more loyal subject, nor the church a sincearer son. He departed this life ye 24th day of November, in the yeare of grayce, 1669."

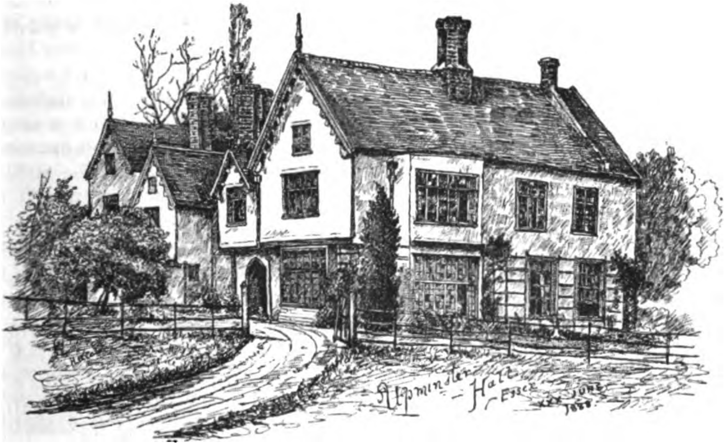
The oldest memorial is a very large and long slab in the centre of the nave, with matrices of an all-round inscription, and two others, probably made for shields or arms, or other cognizances.

A plain white marble tablet, on the eastern wall of the chancel, records the death in 1821 of the Rev. John Moore, LL.B., a former rector of the parish, minor canon of St. Paul's, and "one of the priests of His Majesty's Chapel Royal," well known in his day for his high attainments in Hebrew, biblical, and ecclesiastical literature. The church also contains a memorial to another rector, the Rev. Robert Collier Packman, minor canon of St. Paul's and "the genial associate of Sidney Smith." In the new chapel is a white marble tablet, with a beautifully carved shield of arms, in memory of Susanna Hatton, fifth daughter of Sir Thomas Hatton, bart., of Long Stanton and Conington, Cambridgeshire, who died unmarried, 1842, in her 82nd year. She is buried in the vault beneath, and close by is a large hatchment quartering ten coats of arms, which was brought here after attachment to her residence for the usual period. She lived for many years in this parish in the house known as "Goldsmith's Farm," on the road towards Horndon-on-the-Hill. When the church was repaired and enlarged in 1834, Mrs. S. Hatton gave by far the largest subscription, amounting to £110. A pretty view of the old church, as it appeared in 1833, is given in Palin's "Stifford and its Neighbourhood."

An estate in this parish was settled by Thomas White, D.D., the munificent founder of Sion College, as an endowment of the Professorship of Moral Philosophy, founded by him in Oxford in 1621.

After thanking Mr. Poole for his kindness the party re-ascended the lane to the top of the hill, where the new church, built 1877 of Kentish rag-stone and dressed flints, was passed on the way to the "Crown" inn, where the usual "high tea" was served. After tea an adjournment to the garden of the inn took place, where, at a spot commanding extensive views to the north and east in clear weather, a meeting was held, and on the proposal of Mr. Fitch, as President of the Essex Field Club, and Mr. F. W. Rudler, as president of the Geologists' Association, a vote of thanks was heartily given to Mr. Whitaker for his exertions as geological guide. In replying, Mr. Whitaker, at the request of many members, gave some account of the geological conditions necessary to ensure success in the boring of deep wells, such as that at the railway station, and the party descended the northern slope of the hill to catch the London train.

[It should be stated that the greater part of the above report was kindly furnished by Mr. Holmes, and the Editor has also to thank Mr. Crouch for some notes. We were indebted to the Manager of the London, Tilbury and Southend Railway Company for concessions, most useful in arranging this large and successful meeting.—Ed.]



Upminster Hall, June 30th, 1888. From a Drawing by H. A. Cole.

Field Meeting at Upminster, Saturday, 30th June, 1888.

A pleasant excursion to this rural village was made by about seventy members, under the leadership of Mr. Walter Crouch, F.Z.S., one of the vice-presidents, when, favoured by sunshine, the chief points of interest were visited, before proceeding to Upminster Hall, to which a kind invitation had been issued by Mr. and Mrs. G. P. Hope.

The first place visited was the church, where the party was received by the retcor, the Rev. P. M. Holden. Some notes on the parish and church were here read by Mr. Crouch, who said that although the railway had now been opened for about three years, only four new houses had been built, and that the village still retained its pleasant and picturesque appearance, with fine and substantial residences and farmhouses, some very ancient and quaint, and formed indeed a good type of rural Essex in the olden days. It has been supposed that the British trackway between London and Camulodunon, the capital of the Trinobantes, passed through this village and Hornchurch.[1]

The parish is long and straggling, like so many on the margin of the Thames, being about six miles long from north to south, and scarcely a mile in width. For a long distance on the west it is bounded by the pretty Ingrebourne Brook, which has its outlet in Rainham Creek. In the southern part of the parish *was* Chafford (Chad's-ford) Heath which gave its name to the Hundred, but this is now under cultivation.

The Park of Stubbers, the residence of our late member Colonel Russell (*née* Champion Branfill) follows the line of the boundary, but is in North Ockendon parish.[2]

In the northern portion beyond Upminster Hall lies the common, and at the north-east corner near Tyler's Hall is (or was formerly) a *Mineral Spring*, which is known to but few, if indeed the exact site can now be traced. Mr. Wilson says of it in his "History and Topography of Upminster" that it probably never obtained high repute from want of patrons, although it was mentioned by Dr. Derham and several old writers. "Allen recommended it for 'agues and dropsies, the common diseases of the county; and the salt of these waters may be conveyed to any distance and taken with as much benefit as on the spot.' This spring was cleaned out and enclosed in 1734, by Champion Branfill, Esq., of Upminster Hall, Lord of the Manor in which the spring was situate, and was kept so for some years. A writer, speaking of this spring in 1834, 100 years after it was enclosed, says, 'Many persons now living recollect its being enclosed, but it is now unenclosed, and nearly filled with mud, which, and the water, are both of a most nauseous smell, but tasteless. Some bricks lately taken out are turned black to the middle of them; the smell strongly resembles that issuing from a smith's trough in which hot iron is plunged; this probably is testimony of its mineral qualities.'" The water has never been properly analyzed, but it was said to contain magnesium sulphate and sodium chloride and, of course, iron from the decomposed pyrites in the London Clay.

Upminster Church, dedicated to St. Lawrence, was rebuilt in 1861, on the original plan, with nave and chancel separated from the north aisle and chapel by pointed arches and four-clustered pillars, which are original work belonging to the old church; as is likewise the tower, which opens into the nave by a large arch. The North or Gaines Chapel was a charity founded by Sir John Engaine (or D'Engaine) *circa* 1242. In later times it was called by its present title, St. Mary's Chapel. It is divided from the north aisle by a carved oak perpendicular screen (*temp.* Henry VI.) and was rebuilt in 1771, and again in 1861. The font was formerly in the chapel at Upminster Hall, but has been newly carved. The old square tower, probably as old as the time of King John, was damaged by lightning in 1638, and refaced in 1861. It is roofed with lead-covered eaves, then some weather-boarding, surmounted by a short shingle spire and vane, and is altogether about 79 feet high. The woodwork inside, and the bell framings in parallel lines on the side of the wall are curious, and bear evidence of early date.

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[1] This statement appears to be unsupported by facts. Mr. Flaxman Spurrell; who is intimately acquainted with the district, and who surveyed it in 1865, and since, from an antiquarian and geological point of view, found no evidence of a British or Pre-Roman trackway which could be laid down.—ED.

[2] Colonel Russell died on May 16th, 1887. An obituary notice of him will be found in the ESSEX NATURALIST (vol. i., page 139). It may be well to mention that Prof. Meldola is preparing a notice of Col. Russell's important contributions to photography, which will be read at one of the autumnal meetings of the Club.—ED.

The porch was also rebuilt in 1861, and occupies the same position as the old one, which was of red brick of Henry VIII. date, with cusped panels and small buttresses above on each side of the doorway, and a rose above.

The north window of the chapel contains the armorial bearings of the older lords of the manor of Gaines—the Engaines, D'Eyncourts, and Lathams—and there are several brasses with effigies remaining. There are also monuments in the nave to the Cox's of Harwood Hall, and others; in St. Mary's Chapel to the Esdailes, of Gaines, 1793—1838; and in the north aisle a series of monuments to the members of the Branfill family, of Upminster Hall, whose vault is beneath St. Mary's Chapel. There are memorials of some of the former rectors in the churchyard; and on the pathway where the two yew avenues meet are the gravestones of William Braund of Hacton House, Benjamin and Mary Branfill, and other connections of the family.

Although the celebrated Dr. Derham, F.R.S., canon of Windsor, was rector from 1689 to 1735, and was buried in the chancel, no gravestone or memorial of any kind has been erected; but Mr. Crouch pointed out the little door high up on the south side of the church spire by which he obtained access to the platform or staging which he used as a local observatory for his astronomical and meteorological researches.

On the kind invitation of the rector the party then passed into the Rectory grounds and house, which was rebuilt by Rev. Samuel Bradshaw about 1765, and is in the form of the letter H, with a central hall. The old rectory was moated, but only a pond now remains as a vestige of this environment.

After an expression of thanks to the rector for his courtesy, the members proceeded through the yew avenue and across the road to

HIGH HOUSE, where Dr. Derham resided during the last forty-six years of his life, the old rectory being too dilapidated to live in. Assembling on the lawn under the old cedar, a few remarks were made by the conductor on the house and its history, and the cedar, eighteen feet in girth, which still towers high, but which was shorn of its grand limbs by the storms of last winter. A former owner, Dr. Tabrum, had his coffin made from one of the branches Lord Byron visited this house when his friend Major Howard was living here, and wrote in it several of the stanzas of "Childe Harold."

In the absence of Prof. Boulger, F.L.S., a paper of his on "The Life and Works of Dr. Derham" was read by Prof. Meldola, F.R.S., who supplemented it by reference to some interesting letters which passed between Dr. Derham and his friend Dacre Barrett Lennard of Belhus (some four miles south), which are preserved there, and show how his friend helped him in his experiments on the velocity of sound. (See Wilson's "Upminster.") Prof. Boulger's paper will be published in the ESSEX NATURALIST.[3]

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[3] It may be noted that Dr. N. Salmon, in his "History and Antiquities of Essex" (1740), refers to the collections of Dr. Derham, and says that "they have been very useful in this account of Upminster, as well as those of the late Mr. Champion Branfill." *Quære*, where are these collections now?

A hearty vote of thanks was proposed by the President, Mr. E. A. Fitch, F.L.S., to Prof. Boulger for his paper, and to Mr. Rowe for so kindly opening his house and grounds, which was seconded by Mr. Walter Crouch, who also wished to express his personal thanks to Mr. Rowe for the permission so freely accorded.

A ramble was then made across the fields to Hacton House, a red brick mansion, built by William Braund, an uncle or brother of "The Belle of Essex," He lived with her at Upminster Hall after the death of her husband until they quarrelled about a black servant of hers. Whereupon he bought the land at Hacton, opened a clay pit, and burnt his own bricks for this house.

The party then proceeded by the footpath and across Gaines Park, where Mr. Crouch made some remarks on the interesting history of the old manor and its early owners. A new palladian house was built here for Sir James Esdaile in 1771, designed by Paine, who also designed Thorndon and Hare Halls; but this was all pulled down in 1820, except a portion of the east wing. Sir James also improved the park by planting shrubberies, and a pretty walk on the west side, sheltered by Wych Elms, and turned the steam, on the south of the park, into a lake with islands, cascades, and an ornamental bridge of three arches, over which, in his day, a pathway led to the Octagon Lodge at Corbet's Tye. He also built Harwood Hall, for his son-in-law, the mansion at New Place, or "Clock House," the "Bell Inn," the farmhouses of Tadlows and Hunts, etc., and it is no doubt due to him that the place is now so pleasant and rural.

UPMINSTER HALL, from the "Topographer," 1789.

On leaving the park, the party returned to the village by road, passing the old farmhouse, Hoppy Hall, a picturesque place of timber and plaster, with a fine cedar about 45 feet high, which was planted about 100 years ago. The largest branch, which fell in 1852, was nearly 50 feet long.

On arriving at UPMINSTER HALL, the members were very cordially welcomed by Mr. and Mrs. Hope, who had provided a most substantial tea and other refreshment. After tea the old house, with the family pictures of the Branfill's, the pretty grounds and avenues, and Mr. Hope's extensive series of birds and other natural history and geological collections were duly inspected.

The Manor of Upminster was for nearly five centuries the property of the Abbey of Waltham Holy Cross, and the house was doubtless one of the quiet retreats of the abbots. They built a chapel, north of the hall, which Morant tells us was of stone and entire in his day. It was pulled down about the middle of last century by Champion Branfill, who then gave the font to the church. A brick vault which still exists in the garden was probably that immediately under the old chapel.

After the dissolution, the Manor was granted in 1538 to Thos. Cromwell, Earl of Essex. On his execution, 1540, it reverted to the Crown and was alienated by Henry VIII. to the Lathams (of North Ockendon and Stifford, and whose family are well known in connection with the defence of Latham House in Royalist times), who held it for 99 years, and after several changes it was purchased in 1685, from the Earl of Gainsborough, by Captain Andrew Branfill, in whose family the property still remains.[4] The Hall, which is built of oak and plaster, was doubtless the rebuilding of an older house by one of the later abbots, and is about 400 years old. The porch with its carved barge-boards and finial, and the large hall with its massive beams and panels are probably the older portions of the building. The staircase and gallery are later—of Carolean period—and other changes have been made to meet the varying tastes of successive generations.

To the east of the Hall is a large fish pond with a rustic bridge across it, and this might have formed in past times a portion of the Moat. On the north is a triple avenue, consisting of two rows of chestnuts between two rows of walnut trees.[5] In the gardens are some very interesting plants in a semi-wild condition, but the attention of the naturalists of the party was mainly directed to Mr. Hope's collections, which are displayed in the great hall. The large gatherings of Marine Algæ from Harwich and its neighbourhood were exhibited at a meeting of the Club on February 23rd, 1884, and some comments were then made upon them by Mr. E. M. Holmes, F.L.S. Mr. Hope's cabinet of Crag fossils is extensive, and his birds (nearly all of which were shot and "put up" in cases by himself) are well worthy of careful examination. It would be impossible to give here a full list of them (we may hope to print such a catalogue hereafter), but a few of the more interesting *Essex* specimens, with Mr. Hope's notes thereon, may be indicated:—

SOME ESSEX BIRDS IN MR. HOPE'S COLLECTION.

Parus britannicus, S. and D. (Coal Titmouse.) Common at Havering.

Motacilla melanope, Pall. (Grey Wagtail) Found dead at Upminster, under the ice, February, 1888.

Passer domesticus, L. (Sparrow.) A white specimen at Havering in 1880.

Passer montanus, L. (Tree Sparrow.) At Havering and Stubbers Park.

Fringilla montifringilla, L. (Brambling.) Caught with sparrows at Stubbers, in February, 1868.

Linota rufescens, Keill. (Lesser Redpole.) At Upminster, in February, 1888.

Corvus corone, L. (Carrion Crow.) Very common at Upminster, in February, 1887.

Corvus cornix, L. (Hooded Crow.) Shot on the "Main" (a tract of mud or sand, about 12,000 acres, between the Maplin Sand and the Blackwater river), February, 1874.

C. frugilegus, L. White specimen of Rook, at "Nelmes," Hornchurch, June, 1888.

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[4] Captain Andrew Branfill had married in 1681, Damaris, daughter of John Aylett, of Kelvedon Hatch, and grand-daughter of Captain Aylett, one of the Royalist defenders of Colchester, who afterwards adopted the motto, "Not in Vain," which is still used by the Branfills.

[5] Pretty views of the Hall, the willow island, the pond, the shrubbery, etc., and notable spots in the neighbourhood, have been drawn by the present owner to illustrate the new edition of Wilson's "Upminster."

Dendrocopus major, L. (Greater Spotted Woodpecker.) Found dead under snow, Weald Park, 29th January, 1887.

D. minor. (Lesser Spotted Woodpecker.) Male, near Romford, February, 1880; female, at Upminster, in 1888. Common.

Gecinus viridis, L. (Green Woodpecker.) Havering, 1874-76 and 1881.

Upupa epops, L. (Hoopoe.) Shot in mistake for jay, at Forest Hall, May, 1886. Female.

Athene noctua, Scop. (Little Owl.) Buckhurst Hill, 15th October, 1875. Killed by flying against a tree.

Falco subbuteo, L. (Hobby.) Stratford, in the autumn of 1875.

F. æsalon, Tunst. (Merlin.) At Stubbers, in 1887.

Pandion haliaëtus, L. (Osprey.) Heybridge Basin, January, 1880.

Botaurus stellaris, L. (Bittern.) At Ilford, Christmas, 1872; Harwich, January 15th, 1886.

Bernicla leucopsis, Bechst. (Barnicle Goose.) Near Maldon, March, 1886.

Tadorna cornuta, S. G. Gmelin. (Sheld Duck.) Harwich, December, 1876.

Spatula clypeata, L. (Shoveller.) Two males on the "Main," April 27th, 1867.

Harelda glacialis, L. (Long-tailed Duck.) Two in summer plumage, Maldon, February, 1879; a female, full plumage, at Harwich, Nov. 9th, 1887.

Somateria mollissima, L. (Eider Duck.) Immature male, on the "Main," November 2nd, 1882.

Œdemia fusca, L. (Velvet Scoter.) Maldon, February, 1884.

Tringa subarquata, Güld. (Curlew Sandpiper.) On the "Main," August, 1883, male and female in full plumage, with two others.

Machetes pugnax, L. (Ruff.) Colne Beach. Spring of 1874. Males. One on Rainham Marshes, August 17th, 1888, attracted by flood waters.

Sterna cantiaca, Gmel. (Sandwich Tern.) Two at Harwich, June, 1865.

Stercorarus pomatorhinus, Temm. (Pomatorhine Skua.) Harwich, August, 1876.

Mergulus alle, L. (Little Auk.) "Main;" picked up exhausted, but alive, after a gale, January, 1881.

Colymbus glacialis, L. (Gt. Northern Diver.) Blackwater, January, 1880.

During the evening an ORDINARY MEETING of the Club (the 91st) was held in the Dining Room, Mr. Edward Fitch, President, in the Chair. The following were elected members of the Club:—Rev. W. J. Bettison, Captain E. Dickinson, R.E., Messrs. W. H. Dey, W. D. Gooch, C.E., J. P. W. Goodwin, Wilson Marriage, James Murie, M.D., LL.D., F.L.S., Nicholas Parry, John Rogers, Sydney Young, and Mrs. T. B. Linley.

A very cordial vote of thanks to Mr. and Mrs. Hope for their kind welcome and hospitality was proposed by the President and Col. Brydges Branfill, who said that, as a member of the Club, he had very great pleasure in seconding this proposal, but also wished to add his personal thanks, as one of the Branfill family, to Mr. and Mrs. Hope for their evident interest in, and the care taken of, the old Hall. He only wished that everyone connected with like interesting old places could secure such good and kind occupants as their host and hostess.

In reply, Mr. Hope said that it gave great pleasure to his wife and himself to welcome the Club that afternoon, and he could only express the wish that, if possible, the visit might be made an annual one.

Mr. Crouch exhibited and made some remarks upon the two specimens of Pallas's Sand Grouse, already recorded in the ESSEX NATURALIST (*ante* page 63).

Mr. J. E. Harting gave some very interesting details of the habits of the bird, and compared its former immigrations into Britain with the present one, which he considered as likely to exceed them all in importance. He had already heard of three instances in which the birds had actually nested, and he most emphatically urged on all who might meet with specimens not to shoot or molest them. It was quite possible that the bird might breed here—there was nothing in our climate, or the character of some parts of the country, to prevent such a desirable result of the present great irruption of this singular bird.

Mr. Crouch also exhibited a few old engravings of the Hall and Church, portraits of Dr. Derham, etc., and read some notes upon the Manor and Village (which are embodied in the foregoing report), calling attention to some of the more noteworthy family portraits, among others to that of Captain Andrew Branfill, the first owner of that name, with peaked beard and scarlet coat with large white collar; his son Champion (named after Captain Branfill's favourite vessel "The Champion," in which he made from Dartmouth, his native place, many a successful and profitable voyage, and an old painting of which off Portsmouth, is still an heirloom at the Hall), High Sheriff of Essex in George II's time. He married Mary Braund of Romford, toasted in her day as "The Belle of Essex," and whose two counterfeit presentments, said to be the work of Sir Godfrey Kneller, still beam from the walls. Mr. Crouch concluded by saying: "Upminster Hall forms a pleasant picture with its many gable ends, old chimneys and windows, its beams, and panelling, and the series of pictures of the Branfill's and their connections which adorn the walls. In such a place we seem to breathe a calm old-world atmosphere, rich with the memories of olden days; and this greatly enhances the pleasure which we must all feel at the kind and hospitable welcome we have received from Mr. and Mrs. Hope to-day."

A vote of thanks was passed to Mr. Crouch for his services as Conductor, on the proposal of Prof. Meldola and the Rev. Lancelot Sharpe. The latter speaker asked whether any record existed of the various moated houses in Essex Mr. Crouch said that he contemplated compiling such a list, and would be glad of any information on the subject from members of the Club. He referred to the moated enclosure in the fields between Buckhurst Hill and Chigwell, concerning which no information was forthcoming, either from local residents or from the various histories of Essex.

[We have also to thank Mr. Crouch for the two illustrations of Upminster Hall; one is from a drawing made by Mr. H. A. Cole, from a photograph taken by Mr. O. Osborne, and the other is from an old engraving in the "Topographer," 1789.—Ed.]

Snow Crystals.—I am glad to find that the Rev. Linton Wilson has recorded (E. N. ii. 53) the fact of the enormous size of crystals of snow occurring during the sharp weather of February and March last. I may add that the actual measurement of some I noticed, on two separate days, was a trifle over one-sixth of an inch; and the six rays, with various combinations of form, were pretty clear even to the naked eye. I have never noticed such large crystals myself since the winter of 1860—1, when snow and frost was intense from Christmas to latter part of January.—Walter Crouch, Wanstead, May 1st, 1888.

THE ESSEX FIELD CLUB.

FORTHCOMING FIELD MEETING.

The next Field Meeting will be held at Maldon, on *Friday and Saturday, September 14th and 15th*, under the control of our President, Mr. E. A. Fitch, F.L.S. (Mayor of Maldon). It is proposed to devote the Friday to a survey of Maldon and its neighbourhood, and on the Saturday Mr. Fitch will arrange a Barge excursion in the estuary of the Blackwater. It will be necessary for members to travel down to Maldon on the Friday, as the river excursion must start with the tide early on Saturday morning. Inn accommodation will be arranged for, and full particulars will be sent to members by circular.

THE LATE FLOODS IN ESSEX.

Mr. D. Radford Sharpe, F.R.Met.S., of "*The Croft,*" *Braintree, Essex*, has undertaken to prepare a report on the above for the Essex Naturalist. He will be glad to receive any local notes, registers of rainfall, newspaper cuttings, photographs, &c., relating to the matter. Members are requested to aid Mr. Sharpe in any way in their power.

ESSEX NATURALIST.

Owing to heavy work in connection with reports of Field Meetings, the July Number was delayed, and is now issued with the August Number. An extra sheet of 16 pp. is added. It is probable that the September Number will consist of two sheets, in order to clear off the reports and other matter.

BRITISH ASSOCIATION.

The Essex Field Club has again been re-appointed one of the Corresponding Societies of the British Association for the Advancement of Science. Prof. R. Meldola, F.R.S., is Delegate for the Club at the meeting, which will open at Bath on September 5th.

SUBSCRIPTIONS (IMPORTANT).

It is particularly requested (in order to save time and trouble to the officers in sending out notices) that all Subscriptions be sent in immediately. A very large number of Subscriptions are still unpaid, which is a source of great trouble and annoyance to the officers.

Subscriptions (10s. 6d.) for 1888 *became due on January 1st*, and should be sent only to the Treasurer, Thomas Royle, Esq., "Dalton House," Upton Lane, Forest Gate, E. Post Office Orders should be made payable at Stratford, E., and Cheques crossed "London and County Bank," Stratford Branch.

"HISTORY AND TOPOGRAPHY OF UPMINSTER."

A New Edition, considerably enlarged and improved. The numerous engravings of objects of interest in the parish and neighbourhood are by Colonel B. A. Branfill. Text by T. L. Wilson, Upminster, from whom copies may still be had. Large paper, 18s.; Small paper, 15s.

6S.

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The
Essex Naturalist:

BEING THE

JOURNAL

OF THE

ESSEX FIELD CLUB.

EDITED BY

WILLIAM COLE,
Honorary Secretary.

Contents:

The Essex Field Club.—Field Meeting at Upminster (*concluded*) 137
Notes.—Snow Crystals—WALTER CROUCH; The Toper Shark (*Galeus vulgaris*) on the Essex Coast—HENRY LAVER 137
The Subterranean Geology of South-Eastern England *(illustrated.)*—By T. VINCENT HOLMES, F.G.S. 138
Notes.—Honey Buzzard at Little Baddow—C. SMOOTHY; Migratory Swarms of *Libellula quadrimaculata* off the Essex Coast 158
Wild-fowl Decoys in Essex (*with plate and illustrations.*)—By J. E. HARTING, F.L.S. .. 159
Notes.—Hobby Catching a Swift—ROBERT BROOKS; Musical Tastes in a Robin—FRANK B. ROGERS; *Lathyrus tuberosus*, L. in Sussex; *Colias edusa* at Woodford—W. S. ARGENT .. 169
Essex Heronries *(illustrated.)*—By EDWARD A. FITCH, F.L.S. 171
Notes.—*Sphinx convolvuli* in Essex; The Diptera of Epping Forest—E. BRUNETTI 186
Flint Implements at Walton-on-Naze, and Lexden, Essex.—By HENRY LAVER, M.R.C.S. 187
Notes.—*Deilephila galii* in Essex—B. G. COLE; *Acherontia atropos* at Maldon—B. G. COLE .. 188
Contributions towards a List of the Fungi of Essex—Discomycetes.—By M. C. COOKE, M.A., LL.D. 189
Notes.—A Swallow Bowled Out at Cricket; Nests of the Kingfisher and Meadow Pipit—J. H. GURNEY, Jun.; Black Redstart Nesting in Essex 192

The authors alone are responsible for the statements and opinions contained in their respective papers.

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1888.
[Ent. Stationers' Hall.]

All Communications should be Addressed:—
The Editor of "THE ESSEX NATURALIST,"
7, Knighton Villas, Buckhurst Hill, Essex.

SUBSCRIPTIONS FOR 1888 ARE NOW DUE: SEE FOURTH PAGE OF WRAPPER.

“THE BIRDS OF ESSEX”:
A REQUEST.

I HAVE been, for more than fifteen years past, collecting materials for a work on “The Birds of Essex,” similar to the many other County Avifaunas already published. The information collected will soon be sufficiently complete to warrant publication. I have already obtained sufficient matter to ensure for the County of Essex a very high position, ornithologically speaking; but I am anxious to render my information still more complete, by appealing to ornithologists and sportsmen, and all who take an interest in Natural History, to supply me with intelligence of the occurrence within the County of any rare, or otherwise interesting birds, not hitherto recorded. There are hundreds of houses throughout Essex containing collections or single specimens of rare stuffed birds, of which it is impossible to obtain any intelligence, except by means of a public appeal of this kind.

I may add that I am especially anxious to obtain information as to the occurrence in the County of the following, among other rare species:--

White's Thrush, Blue Throat, Marsh Warbler, Black-bellied Dipper, Richard's Pipit, Lesser Grey Shrike, Pine Grosbeak, Ortolan Bunting, Lapland Bunting, Squacco Heron, Night Heron, Ruddy Sheldrake, White-eyed Duck, Black Grouse, Crane, Collard Pratincole, Cream-coloured Courser, and Greater Shearwater.

I shall also be very glad of further information regarding the occurrence in the County of the Dartford Warbler, Fire-crest, Black Redstart, White Wagtail, Cirl Bunting, Golden Eagle, Goshawk, Gyr Falcon, and Glossy Ibis.

“*THE BIRDS OF ESSEX*”

will be published partly by the ESSEX FIELD CLUB, in the shape of a volume of about 200 pages, similar to the “Report on the East Anglian Earthquake,” already published by the Club. The work will probably make its appearance in the latter part of next year, when it will fill a very obvious blank in the valuable series of County Avifaunas already published, Essex being one of the very few important English Counties whose birds have not yet been specially described. I intend that the work shall be fully illustrated.

MILLER CHRISTY,
CHIGNAL ST. JAMES,
CHELMSFORD, ESSEX.

urged on all who might meet with specimens not to shoot or molest them. It was quite possible that the bird might breed here—there was nothing in our climate, or the character of some parts of the country, to prevent such a desirable result of the present great irruption of this singular bird.

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The Toper Shark (*Galeus vulgaris*) **on the Essex Coast.**—A few days since a female specimen of this shark was brought for my inspection, having been captured in a shrimp trawl just outside the Colne. It was four feet nine inches long. Although much commoner on many of the British coasts, its rarity in our Essex waters makes its occurrence worth recording. Our local fishermen appear to know nothing of it.—HENRY LAVER, F.L.S., Colchester, August 26th, 1888.

THE SUBTERRANEAN GEOLOGY OF SOUTH-EASTERN ENGLAND.

By T. VINCENT HOLMES, F.G.S., M.A.I.

(Being the Presidential Address, delivered January 28th, 1888.)

CONTENTS:—Geological maps show rocks on the surface at a given spot.—Knowledge of subterranean geology depends partly on the evidence afforded by the disposition of the surface rocks, partly on that of deep borings.—The geology of South-Eastern England as shown on a geological map.—The evidence of districts outside; of Belgium, the Boulonais, and Western England; bearing upon the geology of S.E. England.—Of deep borings.—Conclusions.

By the subterranean geology of South-eastern England, I mean those details of its geological structure which do not exhibit themselves on the surface of that district, and are consequently not marked on any geological map of it. For the function of a geological map is to show, in such detail as the scale allows, the nature and age of the formations occupying the surface of a country. It is sometimes difficult to say whether a map giving or omitting the drifts or superficial beds, which in many districts overspread the older rocks of various ages, is the more desirable. All depends on the economical importance of the superficial as compared with the older rocks, and on the point of view of the purchaser of the map. In a district like the Yorkshire Coalfield where the superficial beds are thin, do not cover much of the surface, and are of trifling economical importance compared with the coal-measures immediately below, a map omitting patches of drift may be slightly preferable, as allowing a clearer view of the range of the various coal seams and the faults, or dislocations of the strata affecting them. In a district like that of Cumberland north of the Lake Country, where Glacial Drift and other superficial beds cover the greater part of the surface to a depth of many feet, the older rocks giving no signs of their existence over many continuous square miles of country, there is obviously need for maps of both kinds. And in Norfolk, Suffolk and Essex, geological maps omitting the drift are comparatively worthless.

For my object this evening, however, the most useful map is that which most clearly shows the older rocks and the various folds into which they have been thrown, as on the nature and range of these folds, as shown on the surface, deductions as to the probable nature of the wholly subterranean geological arrangements must necessarily be based.

Examination of a good geological map of England and Wales, such as that of Sir Andrew Ramsay, shows us that the oldest, or Palæozoic rocks, are confined to the north-western half of the country. A line ranging from Hartlepool through Doncaster, Nottingham, Leicester, Stratford-on-Avon, Bath and Sherborne, to Sidmouth in Devonshire, would divide a western country, consisting of districts mainly Palæozoic, from an eastern wholly composed of Secondary and Tertiary formations. Thus the Londoner who wishes to see something of the nearest Palæozoic rocks must travel either due west to the Bristol Coalfield or the Mendip Hills, or in a north-westerly direction to Nuneaton, or beyond Leicester. For a journey by the Great Northern Railway will not enable him to see any sections in Palæozoic rocks south of the county of Durham. And as Nuneaton, the nearest to London of the places just mentioned, appears to be 97 miles away, it is evident that the difficulty of ascertaining anything about the nature and depth of the Palæozoic rocks beneath the Secondary and Tertiary formations, which alone are seen in the neighbourhood of the capital, may be very great. For between London and the places where Palæozoic rocks appear, the older formations are covered by the whole of the Jurassic series (Lias and Oolite) of beds, while they are in their turn, as we approach London, hidden from view by the Cretaceous rocks, of which the Chalk is the best known example, while the Chalk is largely covered by Tertiary beds, the most important of which to residents in Essex is the London clay. It is obvious that, looking simply to the number and thickness of these various formations, the resident in Kent, Surrey, Sussex, Middlesex or Essex who wished to bore, if possible, down to the Palæozoic rocks beneath, would do well to avoid the Tertiary beds and begin, if practicable, in the lowest of the Cretaceous strata.

Now while in Middlesex or Essex the utmost that could be done in this way to secure a good site for a boring would be to begin on the bare Chalk, the counties of Kent, Surrey, and Sussex offer considerably greater advantages. For within the area enclosed by the North and South Downs, the Chalk is absent. The North Downs, as the outcrop of the Chalk bounding the northern side of this area is called, range from Folkestone in a north-westerly direction, keeping a mile or two north-eastward of Ashford and Maidstone. West of the Medway their general course is slightly south of west, by Dorking and Guildford to Farnham. Then the outcrop bends round to the south and looks eastward in the neighbourhoods of Alton and Selborne, while near Petersfield it turns so as to face the north, and is known as the South Downs thence to Beachy Head. The absence of the Chalk in this area, known as the Weald, of course enables the borer to avoid a start in six or eight hundred feet of that formation. And in certain parts of the Weald district not only is it possible to avoid the Chalk, but also the rest of the Cretaceous strata, and to begin in the uppermost bed of the Oolitic (or Jurassic) series. The existence of this chalkless district the Weald, is the result of the existence of an anticlinal axis or ridge which traverses it in an east and west direction. This anticlinal is simply a fold of elevation in the strata, the consequence of the action of subterranean forces. There can be no doubt that at one time the Chalk extended across the area between the North and South Downs, and the outlying patches of Tertiary beds now resting on the Chalk here and there, both north and south of the Weald, show that they once formed a continuous sheet above it But as what is now south-eastern England became elevated so as to form land, the Tertiaries forming the highest beds of the anticlinal ridge naturally emerged first and were swept away by the waves, together with the greater part of the Chalk covering the present Weald area. Sub aerial agencies now came into action, and rivers taking their rise in what must have still been slightly the highest ground, flowed northward and southward from the centre of the Weald. The result of the action of these various sub-aerial agencies is to be be seen in the present configuration of the ground. If we journey from London to Brighton we cross the Weald district in a direction nearly at right angles to that of the anticlinal axis, and the arrangement of the rocks becomes obvious to the careful observer. After passing Croydon we leave the Tertiaries of the London Basin, and travel on the Chalk which there dips northwards. Soon after emerging from the Merstham tunnel we see, on looking backwards, the chalk escarpment (or outcrop) of the North Downs, ranging east and west. Brickfields on the flat ground between Merstham and Red Hill mark the outcrop of the Gault clay from beneath the Chalk, while the sandy ridges of Red Hill belong to the Lower Greensand which underlies the Gault. South of Red Hill we cross another belt of flat country, the Weald clay, which there rises from beneath the Lower Greensand of Red Hill. At Three Bridges Station we find ourselves in undulating country consisting of the various sandy and clayey strata known collectively as the Hastings Sands, which underlie the Weald clay and are the lowest beds found in this part of the Weald district. All these formations from Croydon to a few miles south of Three Bridges dip northwards, but the Hastings

Sands, as we go southward, soon appear to undulate gently, and south of Haywards Heath, dip steadily towards Brighton. We have now crossed the centre of the anticlinal axis, and consequently soon find the Hastings Sands disappearing beneath a belt of Weald clay on their southern flank. The Lower Greensand then appears, forming but a feeble ridge compared with that at Red Hill, and the southern outcrop of the Chalk, the escarpment of the South Downs, is conspicuous in front. The Gault plain is crossed, and in Clayton tunnel the Chalk. It will be noticed that the Chalk at the southern end of the Clayton tunnel is destitute of flints, which do not appear till Brighton is almost reached, flint being found mainly in the upper beds of the Chalk, and the dip of the Chalk being there towards the sea. It is thus evident that in this Weald district the lowest beds are in the centre, and that on travelling northward or southward from the middle of the Hastings Sands we come upon higher and higher beds till we reach the North or South Downs.

Sections such as are given in geological works across an anticlinal axis like that of the Weald necessarily greatly exaggerate the heights as compared with the horizontal distances, even when designed with the utmost care. And those drawn so as to be clear and conspicuous on the walls of a lecture room have the same unavoidable defect. In the case of the Weald an explanation of its denudation once current among geologists was based upon a monstrously exaggerated section across it, appeal being made to this section and what it involved as though it had been an exact transcript from Nature. But though this exaggeration of height to length is more or less unavoidable in sections for books or lecture rooms, it often becomes a serious hindrance to the student who expects to see in Nature appearances resembling those shown in the sections of his Manual of Geology. Consequently, to all persons who wish to have an accurate notion of the true proportions of things in the Weald or elsewhere, the horizontal sections of the Geological Survey cannot be too highly recommended. One of these traverses the Weald from north to south, a little east of, but nearly parallel with, the London and Brighton railway.

If instead of traversing the Weald district from north to south we cross it from west to east, from Selborne to the sea, we find that the lowest beds are towards its eastern boundary. In the neighbourhood of Battle, a few miles north-west of Hastings, the Purbeck beds, the highest of the Oolitic series, are here and there exposed in the middle of the Hastings Sands district; and looking simply at the desirability of reaching the Palæozoic rocks after piercing through the fewest formations of Secondary age, this locality seemed the best that could be chosen for the experimental Sub-Wealden boring, which was actually carried on during the years 1872-5. But though the deepest yet made in south-eastern England—attaining a depth of 1905 feet—it not only failed to penetrate to Palæozoic rocks, but even to reach the base of the Oolites, in whose uppermost beds it was begun.

Indeed, there is nothing in the arrangement of the Secondary and Tertiary rocks of S.E. England to suggest any great irregularity in the Palæozoic floor on which they rest. Folds exist such as that of the Weald, or the much sharper one traversing the Isles of Wight and Purbeck, but nowhere east of a straight line drawn from Hull to the Isle of Portland do we see on the geological map patches of Palæozoic rocks surrounded by strata of Secondary age, a sight extremely common west of that line. We have yet therefore to ascertain what grounds exist to justify the theoretical view put forward more than thirty years ago, that Palæozoic rocks might be reached at a moderate depth under certain parts of S.E. England; and to compare these conclusions with the results of various borings that have since been made, chiefly in the neighbourhood of London.

On May 30th 1855, a paper was read before the Geological Society, by the late Mr. Godwin Austen, "On the possible extension of the Coal-measures beneath the S.E. part of England." ("Quarterly Journal of the Geological Society," vol. xii. page 38). The author drew attention to the fact that if we cross the Channel to Belgium, we find that from the valley of the Ruhr to that of the Scheldt near Valenciennes, there extends for 170 miles from east to west a continuous series of productive Coal-measures, which lie on the northern edge of a ridge consisting of still older rocks. From Valenciennes westward (he remarked) the Coal-measures are covered by later formations, and take a direction by Douay, Bethune, and St. Omer to Calais, having been met with on boring for water at the last-named place. This ridge with its coal-basins, doubtless existed beneath the Secondary rocks of S.E. England.

A glance at a geological map of Belgium shows that on or close to this belt of Coal-measures the towns of Aix-la-Chapelle, Liège, Namur, and Charleroi are situated, outlying patches appearing W. of Charleroi, in the neighbourhood of Valenciennes. South of this belt of Coal-measures the country is composed, for a breadth of many miles, of Palæozoic rocks mainly of Lower Carboniferous and Devonian age, while the rest of Belgium, on the north, mainly consists of Secondary and Tertiary rocks, though close to the Coal-measures patches of older rocks may occasionally be seen. The best series of sections obtainable across the Palæozoic rocks of Belgium is that along the course of the river Meuse between Givet and Namur, though it is better to cross the French frontier and begin the inspection at Fumay, thence proceeding northward by Givet and Dinant to Namur.[1] At Fumay the rocks are of Cambrian age, but these are soon succeeded by Devonian and Lower Carboniferous beds. Near Dinant there is a synclinal basin containing Coal-measures. Close to Namur a thin band of Silurian rocks appears, bounded on its northern side by a fault. North of this fault is a second and much more compressed basin of Devonian, Lower Carboniferous, and Coal-measure rocks; Silurian strata appearing on the north as well as the south of this basin. We have thus, between Fumay and Namur, two synclinal basins, that of Dinant and that of Namur. The Dinant coal basin is of no economical importance and does not extend far westward, while the coal of the basin of Namur is that worked in the Boulonais. A singular feature of this basin of Namur is the way in which it has been folded and crumpled up by immense pressure from the south northward; and along the line of fault which forms its southern limit, and which "hades" or is inclined towards the south, the Silurian band known as the Condroz Crest has been thrust upwards, till it overlies the Devonian and Carboniferous rocks. This fault is known as the Great Fault, or Eifelian Fault, and bounds this coal-field on the south from Liège as far as Marquise in the Boulonais,[2] and along its line Coal-measures are met with under Devonian rocks both in Belgium and in France. Prof. Prestwich ("Quarterly Journal of the Geological Society," 1878, vol. xxxiv., page 904) gives an account of some borings made in search of coal at Auchy-au-Bois, near Lillers, in the Department du Pas-de-Calais. Borings for coal westward of Bethune had ended either in Carboniferous Limestone or Devonian rocks, to the discouragement of their directors. Certain geologists, however, ventured to think that at Auchy-au-Bois there might be found a reversal of the strata like that at Namur, and that consequently Coal-measures might be found there below the Carboniferous Limestone and Devonian rocks. Accordingly instead of stopping on touching Devonian strata the borers continued their work. Devonian rocks had been met with at a depth of 131 metres, and geological anticipations were verified by the finding of Carboniferous Limestone at a depth of 168·30 metres. Another borehole was begun a little northward, as the beds were rising in that direction, and there, under Cretaceous rocks, Carboniferous Limestone was reached at a depth of 148 metres, and Coal-measures were found at 170 metres. Another boring was then made still further north, and there Coal-measures were reached immediately below the *Tourtia*, a bed of Cretaceous age. The explanation here, as at Namur, appeared to be that beds of pre-coal-measure age enclosed a fold of coal-bearing strata, the older rocks being thrust over the newer by a crumpling force exerting immense pressure from south to north, and causing the reversal of the beds. This, as in the other case, has been accompanied by the production of a fault hading to the south, up the plane of which the older rocks have been thrust.

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[1] See "The Geology of Belgium and the French Ardennes." Papers by Prof J. Gosselet, Prof. T. G. Bonney, A. Rutot. E. Van Den Broeck, and W. Topley. Published by the Geol. Assoc., 1885. Prof. Gosselet's Paper has been translated by Miss Mary Forster.

[2] In Proc. Geol. Assoc., January, 1879 (vol. vi., pp. 1-37), is "A Geological Sketch of the Boulonais," by Dr. Charles Barrois.

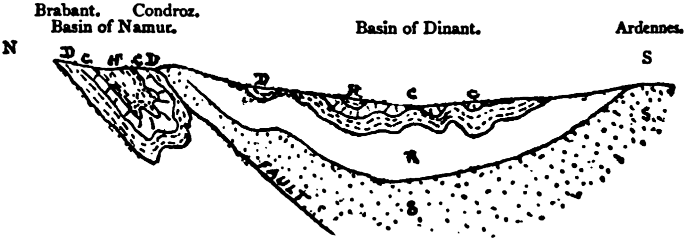

FIG. 1.—Section through the Basins of Namur and Dinant (Gosselet). From the Proc. Geol. Association.

H. Coal-measures. D. Upper and Middle Devonian. C. Carboniferous Limestone. R. Lower Devonian (Rhenan). S. Silurian and Cambrian.

Prof. Prestwich adds that W. of Auchy-au-Bois, the fold of Coal-measures appears to thin away, so that the coal field there, though once continuous with that of Hardinghen in the Boulonais, now forms a separate basin.

Thus, if we examine the geological structure of Southern Belgium and Northern France, we see that (as Godwin Austen pointed out), the evidence from that quarter alone would make it highly probable that this crumpled ridge of Palæozoic rocks still exists on our side of the Straits of Dover below the Secondary rocks forming the surface, and, in all likelihood, at a moderate depth.

Let us now go westward of this part of England and see if beyond the area occupied by the Secondary rocks, there is anything in the disposition of the Palæozoic beds suggesting a continuation there of this Franco-Belgian ridge. In the Mendip Hills of Somersetshire we have, as Godwin Austen observed, its undoubted prolongation westward. For they consist of an anticlinal ridge of Palæozoic rocks (Old Red Sandstone and Carboniferous Limestone), ranging a little south of east and north of west, the strike of the Jurassic rocks east of the Mendips being nearly north and south. The Mendip Hills, as Mr. H. B. Woodward reminds us,[3] do not form one simple anticlinal fold, but their structure comprises a number of folds trending in an east and west direction (fig. 2). Across the Bristol Channel they are seen to be prolonged in the southern promontories of Glamorgan and Pembroke.

These Mendip Hills are the representatives in England of the Condroz Crest of the Coal-field of Namur. As that coalfield was on the northern side of the Condroz Crest, so here in England we see on the northern side of the Mendip Hills and their continuation in Pembroke and Glamorgan the coalfields of Bristol, the Forest of Dean and of South Wales. Therefore we may fairly expect that east of

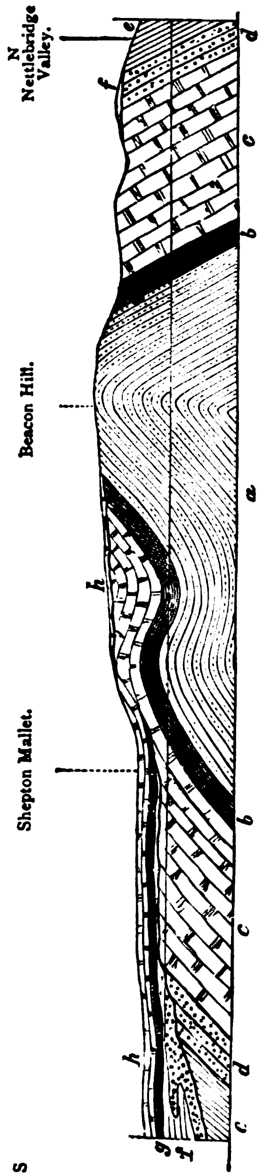

FIG. 2.—Section across the Mendip Hills. Horizontal scale, an inch to one mile. From H. B. Woodward's "Geology of England and Wales."

h Lower Lias.
g Rhætic or Penarth Beds.
f Red Marl and Dolomitic Conglomerate (Keuper).
e Coal measures.
d Millstone Grit.
c Upper Limestone Shales and Carboniferous Limestone.
b Lower Limestone Shales.
a Upper Old Red Sandstone.

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[3] "The Geology of England and Wales," 2nd Edition, 1887.

Somersetshire, where the ground is covered by Secondary rocks, any coal-basins that exist will be found northward of the subterranean prolongation of the Mendip ridge.

Looking from Somersetshire eastward, the probable presence of the anticlinal ridge below the Secondary rocks is shown in the existence of the long narrow valley known as the Vale of Pewsey, towards the western end of which the town of Devizes stands. This vale consists of Upper Greensand, and trends in an easterly direction for about 18 miles from Devizes, being bounded on the north by the Chalk escarpment of Marlborough Downs, on the south by that of Salisbury Plain. The continuity of the Chalk has here been destroyed through the presence of an anticlinal fold which has elevated the Upper Greensand along the line of the Vale of Pewsey and has led to the disappearance of the Chalk there. The continuation of this anticlinal eastward is marked by the appearance of two isolated patches of Upper Greensand in the middle of the Chalk, the more westerly being about four miles south of Hungerford, the other six or seven miles south of Newbury. Proceeding eastward in the direction indicated by these Upper Greensand inliers we come to the north-western end of the Weald district. Mr. Topley[4] points out that in the Weald the chief anticlinal lines are well marked close to but south of the Hog's back (as the escarpment of the North Downs between Farnham and Guildford is called) and between Tunbridge and Tunbridge Wells, the line at the latter place trending somewhat south of east towards the northern end of Romney Marsh. ("Geology of the Weald," pl. 2.) The existence of a special line of upheaval at the north-west corner of the Weald is marked by the extremely high dip of the Chalk between Farnham and Guildford, which greatly narrows the width of its outcrop there; and by making the dip slope almost as steep as the outcrop or escarpment side of the ridge has caused it to receive the name of Hogsback. And about a mile south of Guildford, at Pease Marsh, there is an inlying patch of Weald clay in the midst of the Lower Greensand, which has the same significance as the patches of Upper Greensand in the midst of Chalk south of Hungerford and Newbury. It may be well to add that Mr. Topley (Weald memoir) calls attention to the fact that some of the apparent upheaval in the Weald district is due to the local thickening of the underlying beds.

We may now turn from the evidence afforded by geological structure outside South-eastern England and surface indications within it, to that of deep borings through the Secondary rocks. Those bearing upon our subject are, with one exception, in South-eastern England, the exception being the boring at Burford on the western border of Oxfordshire. There is thus a gap in our boring evidence between Burford and Richmond, a distance of between 60 and 70 miles, which we may hope will some day be much diminished. It will be best on many grounds to consider this Burford boring first. A glance at a geological map shows us that Burford stands on rocks of Lower Oolitic age, and is about 35 miles due east of the Forest of Dean coalfield, and rather more than 30 miles due north of the eastern end of the Vale of Pewsey. Mr. H. B. Woodward ("Geology of England and Wales," Ed. 2) gives the following abstract of this Burford boring:—

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[4] Geological Survey Memoir "On the Geology of the Weald."

Oolite	148	feet.
Lias	598	,,
Rhætics	10	,,
New Red Sandstone	428	,,
Coal Measures	225	,,
	1.409	

Coal-measures were thus entered at a depth of 1,184 feet. They are evidently an easterly continuation of those of South Wales, Bristol, and Forest of Dean coalfields, which, originally continuous, are now broken into separate basins. Looking at the respective distances of the Bristol and Forest of Dean coalfields north of the Mendip Hills, and that of Burford from the Vale of Pewsey, it seems likely that the Burford coal basin lies mainly south of that town, and was touched on its northern edge.

We now come to the borings near or east of London. Godwin-Austen's paper was read, as I have already stated, on May 30th, 1855. Among his concluding remarks are the following:—"It will not be deemed too much to say that we have strong *à priori* reasons for supposing that the course of a band of coal-measures coincides with, and may some day be reached along the line of the valley of the Thames, while some of the deeper seated coal, as well as certain overlying and limited horizons may occur beneath some of the longitudinal folds of the Wealden denudation." The reference to the "deeper seated coal" in the latter part of the above sentence arose from the belief of Godwin-Austen at the time it was written that the Hardinghen coalfield in the Boulonais was not on the same geological horizon as the Basin of Namur, but on a lower one, a belief which the results of the researches of Prof. Gosselet afterwards led him to abandon. Since the reading of Godwin-Austen's paper, all the deep borings in or east of London, of which I am about to speak, have been made, and they have certainly verified his theoretical predictions in showing the otherwise unexpected nearness of a ridge of Palæozoic rocks in the valley of the Thames about London, though no coal-measures have yet been found there. In the volume of the "Quarterly Journal of the Geological Society" which contains Godwin-Austen's paper, appears one by Mr. Prestwich (read a few months later) "On the boring through the Chalk at Kentish Town, London." In this case 325 feet of Tertiary Beds were pierced through, then 645 feet of Chalk. Below the Chalk were 13 feet of Upper Greensand, and 131 feet of Gault. But instead of Lower Greensand and other Lower Cretaceous or Jurassic rocks, the Gault was found to rest on red sands, sandstones, and clays, which are now regarded by Prof. Prestwich as probably Upper Old Red Sandstone, and by Mr. Whitaker as more likely to belong to the Trias.[5] But at first the result of this Kentish Town boring seemed so startling that Mr. Prestwich was inclined to think these red rocks of Lower Greensand age, being led to alter his view in consequence of the evidence of other deep borings within a few miles of Kentish Town have which since penetrated to Triassic or Palæozoic rocks at similar depths.

The deep borings in South-eastern England that have reached either Triassic or Palæozoic rocks are seven in number, and are situated at Kentish Town; Meux's Brewery, London; Richmond; Crossness near Erith; Cheshunt; Ware; and Harwich (see fig. 3). While four others of equal or greater depth, but ending in Jurassic or Cretaceous rocks below the Gault exist at Loughton, Essex; Chatham, Kent; Netherton near Battle, Sussex; and Dover, Kent.

The Chalk in the borings in the neighbourhood of London was very uniform in thickness. The following were the results :—

Richmond	671 feet.	
Crossness	646 ,,	(Wh) 637 (Wo.)
Meux's	656 ,,	
Kentish Town	645 ,,	
Cheshunt	670 ,,	
Loughton	651 ,,	
Ware...	544 ,,	
Streatham	623 ,,	

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[5] "Guide to the Geology of London," Ed. 4, 1884. As the thicknesses of beds given by Mr. Whitaker sometimes differ from those of Mr. H. B. Woodward, I have indicated my authority in certain cases by the letters (Wh.) or (Wo.)

It is evident that the thinness of the Chalk at Ware, as compared with the other places mentioned, is chiefly caused by the fact that the boring was begun in the alluvium of a valley, the full local thickness of the Chalk not having been obtained. At Harwich, some miles north-east of the above localities, the Chalk was found to be 890 feet thick, and at Chatham, on the south-east (Well No. 2 Chatham

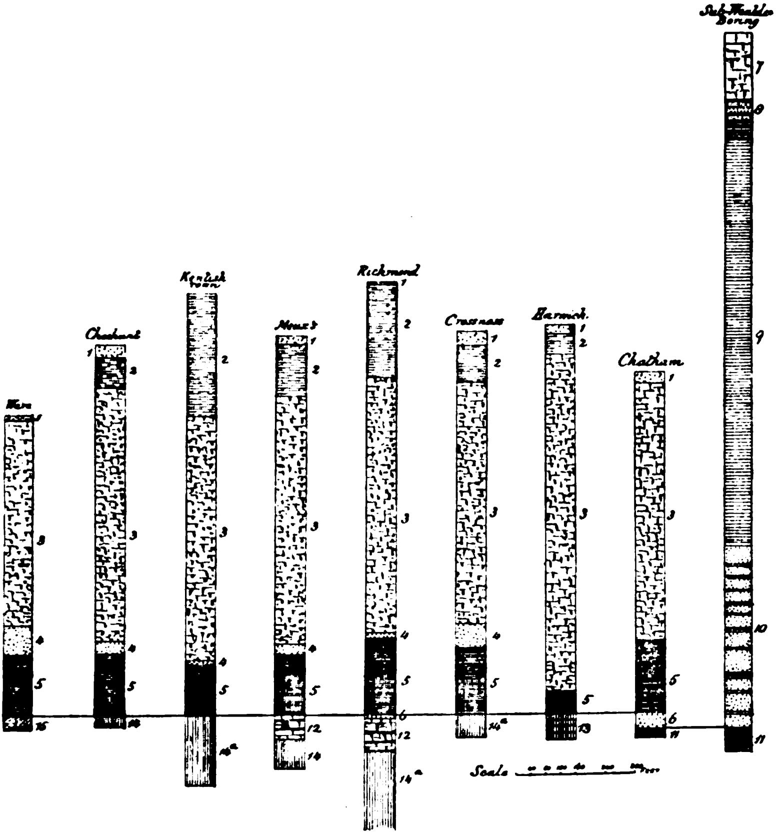

Fig. 3.—Deep Borings of S.E. England (thicknesses from Mr. H. B. Woodward's Geology of England and Wales).

Index to numbers, showing the relative ages of the various beds—

No. 1. Alluvium; made ground, &c.
„ 2. Tertiary Beds.
„ 3. Chalk.
„ 4. Upper Greensand.
„ 5. Gault.
„ 6. Lower Greensand.
„ 7. Purbeck Beds.
„ 8. Portland Beds.
„ 9. Kimeridge Clay.
No. 10. Corallian Beds.
„ 11. Oxford Clay.
„ 12. Great Oolite.
„ 13. Lower Carboniferous Beds.
„ 14. Devonian and Old Red Sandstone.
„ 14a. Beds of doubtful age. Old Red or New Red Sandstone.
„ 15. Upper Silurian Beds.

Dockyard Extension) 682 feet.[6] The extra thickness at Harwich is what might be expected when we remember that further away in the same direction, at Norwich, the thickness of the Chalk was found to be 1,146 feet. (Wh.)

The Upper Greensand is a very thin and unimportant bed in the eastern part of the Weald district, though it thickens westward so as to make a fairly conspicuous escarpment on the Hampshire margin, and is prominent as the crag bounding the Undercliff of the southern shore of the Isle of Wight. It is recorded as being 77 feet at Ware, and 12 feet (Wh.) or 65 feet (Wo.) at Crossness, its thickness at Turnford being 31 feet, at Meux's Brewery, 28 feet, at Richmond, 16 feet, and at Kentish Town, 13 feet. None was recognized at Harwich, and 30 feet at Loughton. This bed often resembles the Chalk so much that it is sometimes a matter of some difficulty to say exactly where the dividing line should be drawn. Doubtless its thickness would have been found to vary very much less had its boundary been determined in each case by the same persons. Mr. Whitaker thinks the Upper Greensand at Ware was probably nearly all Chalk marl, and that at Harwich some may have been included in the Gault.

Below the Upper Greensand the Gault clay was found in every case. Its thicknesses were :—

Richmond	201 feet.	
Crossness	176 ,,	(Wo) 175 (Wh)
Cheshunt (Turnford)	164 ,,	
Ware...	160 ,,	
Meux's	160 ,,	
Kentish Town	131 ,,	
Loughton	172 ,,	
While at Chatham it was	193 ,,	
And at Harwich only	61 ,,	

Thus the thickness of the Gault in the neighbourhood of London was found to vary as little as that of the Chalk. But to the north-east the Gault, instead of thickening like the Chalk, appears to become thinner, being but 61 feet at Harwich, and at Holkham, near Wells, Norfolk, only 10 feet. Hitherto in our downward progress we have met with nothing in the least degree abnormal, but from the bottom of the Gault we find an almost entire absence of Lower Cretaceous and Jurassic rocks in the borings ending in Palæozoic or Triassic beds The thicknesses of Lower Greensand were :—

Richmond	10 feet.
Ware	1 ,, (?)

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[6] See W. Whitaker, "On some borings in Kent," Q. J. Geol. Soc., vol. xlii., 1886. A section added to this paper by Mr. Whitaker, across the Weald of Sussex and Kent into Essex, admirably illustrates the thinning of the Jurassic rocks northwards.

while none is recorded at Meux's, Kentish Town, Crossness, Turnford, and Harwich. At Loughton the boring ends at the bottom of the Gault. In the Chatham well the thickness of the Lower Greensand was only 41 feet. Now Richmond is, as Mr. Whitaker remarks, only fifteen miles north of the outcrop of the Lower Greensand in the Weald district, at a part where it is about 400 feet thick. At Chatham the design of the borers was to obtain a supply of water from the Lower Greensand, which covers an unusual breadth of country around Maidstone, eight miles due south. The uppermost strata, the Folkestone Beds, are usually almost wholly sandy, while the Sandgate Beds beneath them contain a considerable thickness of clay; and in a well at Snodland, only five miles S.W. of Chatham, the full thickness of these Folkestone Beds alone was found to be 100 feet, the full thickness of the Lower Greensand at Maidstone being estimated by Mr. Topley at 225 feet. It is thus evident that the Lower Greensand thins away very rapidly north of its outcrop in the Weald district, and is not likely to be found anywhere in the environs of London, unless in thin isolated patches lying in the denuded hollows of the Palæozoic ridge or ridges.

No Jurassic rocks are recorded as having been pierced at Crossness, Kentish Town, Turnford, Ware, or Harwich. In the two other borings ending in Triassic or Palæozoic rocks the results were:—

Richmond	87 feet	Great Oolite
Meux's	64 ,,	

the Oolite being directly beneath 10 feet of Lower Greensand at Richmond, and beneath the Gault at Meux's. Like the Lower Greensand, it would appear that Oolitic strata about London are only likely to be met with here and there where they happen to have been preserved in folds or hollows of the Palæozoic ridge. Their thinning away north of the Weald district is very remarkable. At Netherton near Battle, the Sub-Wealden boring was made (as already stated) during the years 1872-5. It was begun in the lowest beds which anywhere appear at the surface of south-eastern England, the Purbecks, the uppermost of the Oolitic series; the position of the borehole being about 32 miles nearly due south of Chatham. The result was:—

Purbeck Beds (surface)	180 feet.
Portland Beds...	60 ,,
Kimeridge Clay	1,120 ,,
Corallian Beds	480 ,,
Oxford Clay (left off in)	65 ,,
	1,905

At Chatham beneath 41 feet of Lower Greensand were 22 feet of Oxford Clay, in which the boring ended. Thus we have in this case the disappearance of 1,840 feet of Upper and Middle Oolitic strata in a distance of 32 miles. And near London, as we have seen, Upper and Middle Oolitic strata have been hitherto unvariably absent, and Lower Oolitic beds are only found in two out of the seven borings which reach Triassic or Palæozoic rocks.

As strata of Great Oolite age never appear at the surface in south-eastern England a few words on the nature of the beds of that age found at Richmond and Meux's will be in place here. At Richmond they were chiefly limestone with thin partings of sandstone or clay At the base was a thin "bed of worn shell fragments with particles of anthracite." At Meux's the Great Oolite beds were at first supposed to be Lower Greensand, in spite of the presence of a bed of limestone at the top. But the similarity of the beds below the Gault at Richmond to those stated to have been found at Meux's convinced Prof. Judd[7] that re-examination of the latter was necessary. This was a task of some difficulty, most of the specimens obtained during the progress of the boring having been scattered or lost. It became obvious also, that there were many discrepancies between the various accounts given with regard to these beds below the Gault, which arose, Prof. Judd thinks, "from the circumstance that the strata in question consisted of hard and compact Oolitic limestones alternating with marls of a more or less sandy character. Owing to the method of working by the diamond rock drill, the cores brought up consisted almost entirely of the former kind of rock, the softer marls being broken up and to a great extent washed away in the process of boring. As specimens of the Oolitic limestone were found at short intervals, it was not unnaturally supposed by those who did not watch the boring and measure the cores brought up that the boring was carried on almost wholly in that rock." The late Mr. Charles Moore of Bath, however, had obtained some specimens of the softer beds for examination, and from them had extracted great numbers of minute fossils, and comparison of these with others obtained by Prof. Judd himself both at Meux's and at Richmond showed the identity of the strata immediately beneath the Gault at bot hplaces.

We now come to the Triassic and Palæozoic rocks found in the seven borings which are situated either in the Valley of the

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[7] "Quarterly Journal, Geological Society," vols. xl., xli.

Thames or north of it. Here, for the first time, we meet with considerable difficulties in the way of a certain identification of the various rocks—at least, in three cases. The borings about which there is no doubt as to the age of the rocks at the bottom are: — Harwich (Lower Carboniferous), Ware (Upper Silurian), Turnford (Devonian), and Meux's Brewery (Devonian). But as regards the remaining three there is considerable difference of opinion. At Kentish Town, Richmond, and Crossness, the rocks ir which the borings ended were of a red and mottled character, and the absence of fossils, which are generally very scarce in beds of a red colour, has prevented any decided conclusions as to their age on the part of the able geologists who have examined the boring cores. For the lithological character of these red rocks would furnish but an uncertain guide to their affinities—as determined by an inspection of boring cores—did they come to the surface within 20 miles of London, and becomes a more and more uncertain test in proportion as the position of their outcrop exceeds that distance.

At Richmond the boring ended after piercing through 208 feet of beds consisting almost entirely of red and mottled sandstone, which appeared to be much false-bedded. It was a task of some difficulty to distinguish between this false-bedding and true dip, but Prof. Judd is decidedly of opinion that the true dip was about thirty degrees. He remarks that this high dip, with the natural inference that these red and mottled sandstones are unconformable to the Jurassic and Cretaceous beds above, may be regarded as telling in favour of their pre-Carboniferous age, but adds that it is by no means impossible that the Poikilitic (Permian and Triassic) strata in this district were disturbed and denuded before the deposition of the Great Oolite. He also thinks the lowest beds in the boring much more like the New Red than the Old Red Sandstone. Mr. Whitaker is inclined to agree with Prof. Judd in thinking them Triassic, while Prof. Prestwich, on the other hand, considers them more likely to be Old Red Sandstone.

With regard to Kentish Town, Prof. Prestwich remarks that he found on comparing the Old Red Sandstone in the neighbourhood of Frome with the Kentish Town specimens, that the latter "agreed closely with the Mendip Beds in lithological characters, whereas there was, on the whole, a want of agreement with the Permian or Triassic series." He adds—"I was confirmed in this view after seeing the Red Sandstones and Marls, belonging to the

Devonian series, which crop out from beneath the coal-measures in the neighbourhood of Mons in Belgium." And he feels that this view receives confirmation from the finding of Devonian strata at Meux's Brewery, only three miles south-east. Mr. Whitaker, on the other hand, says that there is a strong reason against the classification of the bottom beds at Kentish Town with the Old Red Sandstone, in the fact that as beds of the Devonian type are present at Cheshunt and at Meux's, "it would be strange indeed were it to occur in its wholly distinct Old Red type at Kentish Town between those two places, and at Crossness not very many miles from the latter of them." With reference to these opposing arguments, Mr. H. B. Woodward, who has had much experience in Devonshire, remarks that specimens at Jermyn Street from the Kentish Town Well closely resemble rocks of the New Red series. But while he supports Mr. Whitaker's view as regards the appearance of the Kentish Town specimens, he thinks Mr. Whitaker's argument as to the improbability of rocks of Devonian affinities at Meux's and others of Old Red Sandstone type at Kentish Town is not so strong as supposed, remarking that, near Torquay, rocks of the two types occur near together, and adding, that "if the Middle Devonian division is intermediate between the Upper and Lower Old Red Sandstone, the argument loses weight."

Of the Crossness boring I need only say that while Prof. Prestwich is of opinion that the red rocks in which it ends are probably Old Red Sandstone or Devonian, Mr. Whitaker thinks they much resemble beds of New Red Sandstone age. They consist of red marls and sandstones.

Mr. Whitaker's opinion that it is exceedingly unlikely that we should get rocks of Old Red Sandstone type at Kentish Town and Crossness, and Devonian rocks at Meux's, between the two, as well as at Cheshunt, is doubtless entitled to considerable weight, even when we bear in mind Mr. Woodward's remark that the types occur close together near Torquay. On the other hand, the fact that as we traverse the country southward from Ware, we begin with Lower Silurian at that place, then come to unquestionable Devonian at Turnford, and to rock of the same age at Meux's, may seem to give some presumption that at Kentish Town, between Turnford and Meux's, beds of that age are more likely to be found than strata of the Triassic period. But if the Lower Secondary and the Palæozoic rocks are thrown into a series of sharp east and west folds beneath

London and its environs, we might easily get Devonian rocks at Meux's and at Turnford, and Triassic Beds in a synclinal basin between those places at Kentish Town. And whether the Palæozoic rocks form many sharp folds or a few broader and gentler undulations, there is not sufficient evidence to determine. But we have seen that in the Department du Pas-de-Calais they maintain the much-contorted character which they have in the neighbourhood of Namur. All of economical importance that the deep borings in and near London have established at present is the fact that it is useless to sink through the Chalk with the view of tapping the water supplies of the Lower Greensand. It is therefore extremely unlikely that many borings for water will in future be made in the immediate neighbourhood of London having that object in view.

Additional borings between Kentish Town and Turnford might do much to show whether any synclinal basin containing Coal-measures exists between those places; and others north of Ware, and between Ware and Harwich, might enable us to judge whether any synclinal basin in which Coal-measures have been preserved exists between the upper Silurian of the former and the lower Carboniferous rocks of the latter place. But of course the true nature of this Palæozoic ridge may possibly only be ascertainable by means of borings piercing through thicknesses of Palæozoic strata so great as to show whether we have in the London district a great simple anticlinal ridge, or series of simple anticlinal and synclinal ridges, or beds so influenced by immense lateral pressure from south to north that they have been actually reversed, Coal-measures being found below lower Carboniferous, and the latter below Devonian rocks, as in the Pas-de-Calais.

If we suppose that no reversal of the Palæozoic rocks has taken place in the London district, and that at Turnford, Kentish Town, Meux's, Richmond, and Crossness the bottom rocks are all Old Red Sandstone or Devonian—Upper Silurian rising from beneath them at Ware—then it is evident that there can be no coal-basin of importance at, or due north of, London and south of Ware. And if we adopt the opinion of Prof. Judd and Mr. Whitaker that at Kentish Town, Richmond, and Crossness the bottom beds are Triassic, this belief would tend but little to modify one's general view. For on either hypothesis it would appear equally probable that Upper Silurian rocks cropping out—below Cretaceous beds—at Ware, and Devonians from Turnford to Meux's, Carboniferous rocks might be looked for south of the Thames, whether covered only by Cretaceous strata or by Triassic beds as well. Thus, as regards the triangular space included between straight lines connecting Richmond and Chatham on the south, with Ware on the north, Coal-measures would seem only likely to be found, if anywhere, along the line between Richmond and Chatham. South of this line the Jurassic rocks evidently thicken rapidly towards the borders of Sussex, as the results of the Chatham and Sub-Wealden borings have so amply shown.

But it appears to me, looking simply at the scanty available evidence (the natural inferences from which might be seriously modified by the results of a single additional boring), that we are more entitled to expect the preservation of coal-basins north-east of Ware than south of Richmond and Chatham; along a line ranging from Ware through Bishop Stortford, Braintree, and Colchester, or thereabouts. For as we have seen, both on the continent and in Western England, coal-basins are found north and not south of the ridge of older rocks, of which here the Upper Silurian of Ware would seem to be the crest, or at least, the nearest approach to it yet proved. Possibly a single boring about midway between Ware and Harwich, might give information as to the position of subterranean coal-measures hitherto unattainable. And apart from any question of speculative probability or the reverse, a boring in this quarter is specially desirable in consequence of the great distance between Harwich and the deep borings nearer London. But we learn both from the Franco-Belgian coal-producing districts and from South-western England that any coalfields in this intermediate country will be found to exist as isolated basins of no great size, which might easily be missed in a single boring planned with much more knowledge than is at present available.

But while two or three borings might give purely geological information of the highest interest and value, and might possibly demonstrate the existence of a coal-basin of considerable size beneath the Cretaceous rocks of Essex or elsewhere, it by no means follows that it would pay to sink to and work the coal thus found unless the cost of obtaining it from our present coalfields had become very much greater than it now is. And I trust the time is far distant when it will be thought desirable to make deep borings in Essex or Kent, simply on the economical ground that our old coal supplies are failing, and it is therefore of the utmost importance that new ones should be opened out. At the same time I should be very glad to learn that various public-spirited persons interested in geology were thinking of raising money to be spent in deep borings in this and other counties to aid in solving this most interesting geological problem. For as no person, society or corporation is likely to bore in Essex with a view of getting a large supply of water from the Lower Greensand, or cheaper coal than can now be obtained there, subscriptions such as enabled the Sub-Wealden boring to be carried on seem to be the only available resource.

But whatever additions may be made to our knowledge of the subterranean geology of South-eastern England before the close of the nineteenth century, and however feeble and imperfect our present knowledge may seem to the geologists of the future, enough has already been ascertained, as we have seen, to demonstrate the general truth of Godwin-Austen's forecast, and to furnish a most striking illustration of his geological knowledge and insight, and of the economical importance which may sometimes belong to purely scientific speculations.

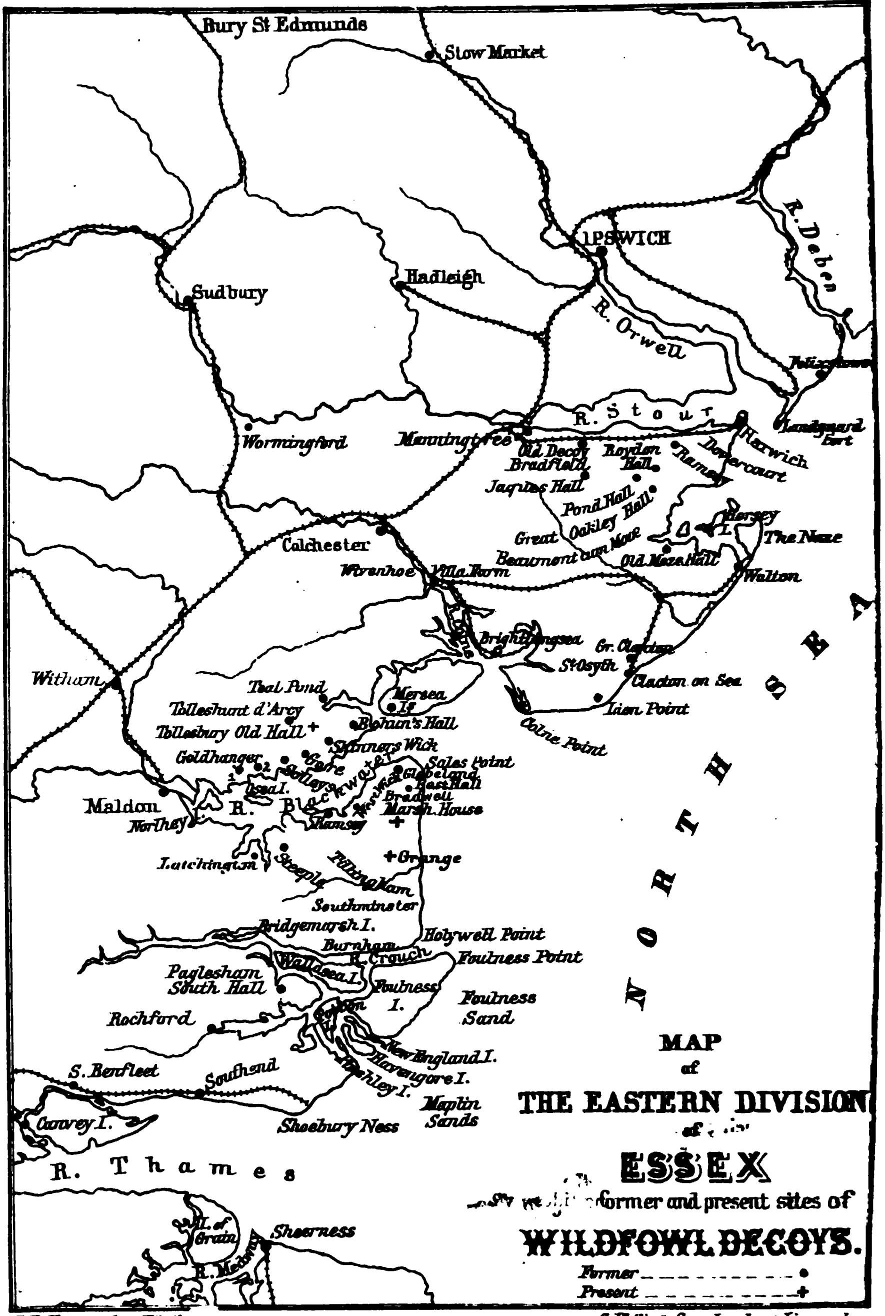
As it is natural that the borings ending in Palæozoic or Triassic rocks should seem to possess much greater interest and importance than those of equal depth which end in the middle of the Oolites, it becomes the more necessary to point out the scientific value of those at Chatham and Battle, which might otherwise seem simply to show that Palæozoic rocks are *not* to be met with at certain depths in those localities. The great distances apart at which the outcrops of particular formations may often be seen have tended to make geologists forget the fact that as almost all the sedimentary rocks have been formed in seas more or less shallow, the belts of ground they occupy may be of no great width, though frequently of very great length.[8] It does not therefore follow that because the outcrop of a particular formation is traceable for hundreds of miles in a certain general direction, the belt of ground it underlies in the direction of its dip need be very broad, apart from the existence of ridges of older rocks like that beneath the Cretaceous beds around London. It may be remembered that the Sub-Wealden and Chatham borings alike ended in a Middle Oolite Formation, the Oxford Clay. The distance between the two borings is only 32 miles, yet in that distance 1,840 feet of beds have disappeared, though the bottom bed in each was the same Mid-Oolite rock, and the Great Oolite—found at Meux's and Richmond—would in all

[8] See "Island Life," by A. R. Wallace, pt. 1, chapter vi.

probability have been pierced also at Chatham, had the boring been deeper. Now in Dorsetshire, where the Oolitic beds above the Oxford Clay are all well shown, their average combined thickness would appear to be, according to Mr. H. B. Woodward, about 1,250 feet, more or less. In the Boulonais, on the other hand, their thickness is given by Dr. Barrois as about 765 feet, while at Battle, as we have seen, it was 1,840 feet. The distance in a straight line from the Isle of Portland to Battle is about 130 miles, and from Battle to the Bas Boulonais rather more than 50 miles. It is noteworthy, therefore, that while we meet with many hundreds of feet of Upper Oolite beds both in the east and in the west, they wholly disappear only 32 miles north of the intermediate place, Battle, at which they are unusually thick. The presence of the Oxford Clay at both Battle and Chatham makes this remarkable thinning away of the Upper Oolitic beds towards the latter place, at the rate of 57½ feet per mile, a very striking example of what must very frequently occur in the case of the shallow-water beds which make up the great mass of our sedimentary rocks. And simply as enabling us to obtain an admirable illustration of the rapidity with which such rocks thin away in certain directions, the existence of the Sub-Wealden boring would be amply justified.

Honey Buzzard (*Pernis apivorus*) **at Little Baddow, Essex.**—On May 18th I shot a Honey Buzzard at Little Baddow. It proved to be a female in good plumage; expanse of wings, 4 feet 4½ inches; weight, 28 ounces. On examining the stomach I found it contained the remains of beetles, caterpillars, and egg-shells. I was not previously aware they took eggs, but on picking the birds up I noticed a quantity of yolk of eggs run from the crop from a hole made by the shot. I have never seen this bird so early in summer; it generally visits us in September. There being few bees or wasps about might perhaps be the cause of its taking eggs.—C. SMOOTHY, Little Baddow, in "Field," June 2nd, 1888.

Migratory Swarm of Libellula quadrimaculata off the Essex Coast. Mr. John Cordeaux, of Great Cotes, Ulceby, writes thus to the "Entomologists' Monthly Magazine" (vol. xxv., 93) under date July 26th, 1888:—"The following came this morning from the master of the 'Swim Middle' light vessel, off the Essex coast:—'I do not know whether the insects will be of any interest to you, but being strangers to me, I take the liberty of sending them. On June 23rd, from 6 to 8 p.m., a flock of them came on board and rested on the ropes, and even on the cable the vessel was moored with from the bows down close to the water's edge. The wind was E. by S., and the weather fine and clear, and I told the man on watch to catch a few, which I forward. I never saw anything like it before.—S. PENDER, 21, Abbott Road, Poplar, E., July 24th, 1888.'" On this, Mr. R. McLachlan, F.R.S., remarks:—"The insects are *Libellula quadrimaculata*, in both sexes. Enormous migratory swarms have many times been remarked on the Continent. The species is no rarity here, but somewhat local, and I think this is the first record of a migratory swarm in this country. The 'Swim' is not far from Shoeburyness, and therefore practically at the mouth of the Thames. According to the direction of the wind they, in all probability, came from Holland and contrived to arrive just before nightfall."



MAP
of
THE EASTERN DIVISION
of [illegible]
ESSEX
[illegible] former and present sites of
WILDFOWL DECOYS.

Former — — — — — — — ●
Present — — — — — — — +

J. E. Harting fecit Feb 1881

G. Philip & Son, London & Liverpool.

WILD-FOWL DECOYS IN ESSEX.

By J. E. HARTING, F.L.S., F.Z.S. (Member of the British Ornithologists' Union).

[*Read February 26th, 1887.*]

With Plate I.

ALTHOUGH the investigations carried on by any Natural History Society need not necessarily be confined to objects within the county, or district, in which the Society has been formed, it is only natural that these should occupy the chief share of attention, since they possess a greater interest for members of the Society than topics having no special relation to the county.

From this point of view it has occurred to me that some account of wild-fowl decoys in Essex might be acceptable to the Society, especially as I have reason to think that the subject may be new to many.

We have only to look at the map of Europe to see how favourably the county of Essex is situated to afford refuge to the vast flocks of wild-fowl which, migrating southward at the approach of winter, come to us from Scandinavia and countries further north, as well as from the opposite shores of Holland.

Looking more particularly at a map of the county, we cannot fail to be struck at the number of important rivers (no less than six) which empty themselves into the sea along its coast, forming wide estuaries and tidal harbours, some of them studded with islands, and bordered in some places for many miles with extensive marshes and mud-flats, which afford attractive feeding ground to many species of wild ducks as well as to large flocks of Brent geese.

One island in particular, Foulness Island, was formerly notable for the colony of Black-headed Gulls, or "*Puits*" as they were locally termed, which annually resorted to breed there. It is thus quaintly noticed by Fuller ("Worthies," page 318):—

> "There is an island of some two hundred acres near Harwich, in the parish of Little-Okeley, in the manour of Matthew Gilly, Esq., called the *Puit* Island, from *Puits*, in effect the sole inhabitants thereof. Some affirm them called in Latine *Upupæ*, whilst others maintain that the Roman language doth not reach the name, nor land afford the bird. On Saint George his day precisely they pitch on the island, seldome laying fewer than four or more than six eggs. Great their love to their young ones; for though against foul weather they make to the main land (a certain prognostick of tempests), yet they always weather it out in the island when hatching their young ones, seldome sleeping whilst they sit on their eggs (afraid, it seems, of sprin[illegible]) which signifieth nothing as to securing their eggs from the inundation, but is an argument of their great affection. Being young they consist onely of bones, feathers, and lean flesh, which hath a raw gust

of the sea. But poulterers take them then, and feed them with gravel and curds (that is physic and food), the one to scour, the other to fat them, in a fortnight, and their flesh thus recruited is most delicious."

The island here referred to, I believe, is Foulness, or as originally spelled Fowl Ness[1]; but how long the gulls continued to breed there I have been unable to discover. Some have supposed that the birds referred to by Fuller were not gulls, but lapwings. Merrett, for instance, in his "Pinax" (1666), takes this view:—

> "*Vanellus*, the lapwing, bastard plover, or pewit. Insula quædam ab iis nomen fortitur in Essexia. Huc enim migrant præcise ad diem Divo Georgio sacrum. *Vide* Fuller. 318."

Charleton also, in his "Onomasticon Zoicon" (1668) makes a somewhat similar statement, and names the island, "Nomen suum *Foulness* nempe, hoc est avium promontorium."

Both Merrett and Charleton, however, appear to have been deceived by the name "*Puit*," which they took to refer to the plover, but which Fuller evidently intended to apply to the gull.

Viewing the county in its present condition, intersected by railways, with thousands of acres of marsh land reclaimed, drained and cultivated, we can form but a faint notion of what a paradise for wild-fowl the Essex coast must have been before an increased population and extended civilization narrowed the limits of their domain. It is difficult to realize the state of things which existed before the introduction of shot guns in the sixteenth century, when wild-fowl were killed with the cross-bow, with trained hawks, or with such kinds of snares and nets as the ingenuity of man at that period could devise; and we have no better proof of their former abundance than the number of decoys which once existed for their capture. Many persons seem to be of opinion that decoys in England are amongst the things of the past, and are surprised to learn that at the present time there are about forty still in use in different parts of the country, while at least 140 others are known to have formerly existed.

The great success which attended the working of decoys in the olden time was due partly to the greater number of wild-fowl which resorted to the places where they were constructed, partly to the absolute stillness which prevailed in these out of the way spots, and partly to the very ingenious contrivance which enabled the fowler to capture a large number of birds at a time without in the least

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[1] The island referred to by Fuller is more generally identified with Pewit Island in Great Oakley parish, between Walton-on-Naze and Harwich. See Messrs. Fitch and Christy's Paper "A Visit to an Essex Gullery," in this part of the ESSEX NATURALIST.—ED.

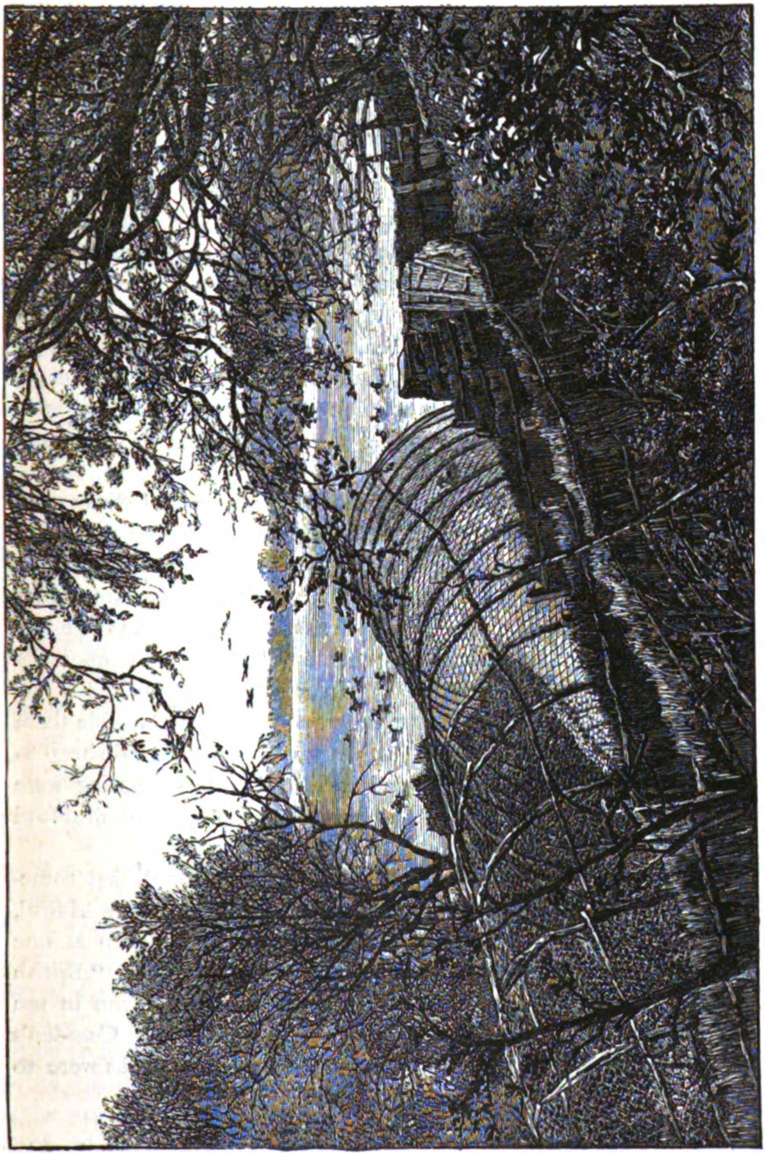

FIG. 1.—THE DECOY POND AS SEEN FROM A PIPE.

alarming the remainder of the flock. The method indeed may still be practised, but the fowl do not come in anything like their former numbers to be caught.

The form of decoy as we now know it was probably (like many another invention) the result of gradual improvement in earlier and simpler methods of capture. The "tunnel net," for example, was a more ancient and primitive device for taking partridges and wild ducks. This net, as its name implies, was shaped like a tunnel, gradually diminishing in size until it terminated in a bag or purse from which, when the birds were once driven in, there was no escape. On each side of the entrance to the tunnel upright nets about eighteen inches high stretched away like wings, and being set in a V shape, with the tunnel at the apex, the birds were slowly but surely directed towards what seemed to them the only aperture for escape, namely, the entrance to the tunnel. Once within the entrance return was hopeless; for the fowler hastened up, and driving them forward, easily secured them at the other end.

But why, it may be asked, did the birds not rise and fly away in good time? For two reasons: in the case of partridges they were driven so slowly by the fowler behind a "stalking-horse" that they suspected no danger, and merely ran gradually away from him towards the net; in the case of wild ducks an unfair advantage was taken by driving them when they were moulting, and had temporarily lost the use of their flight feathers.[a] In this case, if surprised in the marshes, or in pools where the water was too shallow to enable them to escape by diving, they might be driven like a flock of sheep to their destruction, and when several hundred yards of netting were used, and a number of beaters employed, the quantity of wild-fowl thus captured in a day was something extraordinary.

Thus Willughby tells us in his "Ornithology" (1678), that sometimes as many as four hundred boats were used for driving wild-fowl, and that he knew of as many as 4,000 birds being taken at one drive in Deeping Fen, Lincolnshire. Pennant, in his "British Zoology," states that 31,200 ducks were taken in one season in ten decoys near Wainfleet; and Gough, in his edition of Camden's "Britannia," mentions that in 1720, three thousand ducks were to his knowledge driven into nets at one time.

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[a] For some account of the moulting of the flight feathers in the common wild duck, the reader may be referred to Waterton's "Essays on Natural History" (first series, pp. 196-202), Baron d'Hamonville, "Bulletin de la Société Zoologique de France" (vol. ix., pp. 101-106), and Harting, "Zoologist," 1886, pp. 228-233.

. This wholesale destruction of wild-fowl, carried on at a season of the year when they were unable to save themselves by flight, threatened their speedy extermination, and legislative measures were adopted to prevent it. Even so long ago as 1534, in Henry the Eighth's time, an Act of Parliament entitled "An Act to avoide distruction of wilde fowle" was passed with the express object of appointing a "close time" for these birds. The preamble to this act is thus quaintly worded:—

"Where before this time ther hath ben within this realme great plentie of wilde fowle, as ducks, mallardes, wigeons, teales, wild geese, and divers other kinds of wild fowle, wherby not onely the king's most honourable household, but also the houses of the noblemen and prelates of this realme have ben furnished for the necessarie expences of the same houses at convenient prices, but also al markets of the same realme were sufficiently furnished with wild fowle, there to be sold in such wise that such as were mete to make provision of the same for their houses might at resonable prices at the same markets be therof provided. Neverthelesse divers persons next inhabiting in the countries and places within this realme, where the substance of the same wildfowle hath ben accustomed to brede, have in the sommer season at such time as the saide olde fowle be moulted and not replenished with fethers to flie, nor the yong fowle fully fethered perfectly to flie, have by certaine nettes and other ingins and policies yerely taken grete numbre of the same fowle in such wise that the brede of wilde fowle is almoste thereby wasted and consumed, and daily is like more and more to waste and consume; if remedie be not therefor provided."

The statute accordingly went on to provide that any person or persons taking wild-fowl with nets or other engines between the last day of May and the last day of August should, on conviction, suffer a year's imprisonment, and forfeit for every fowl so taken fourpence Another section of the same Act made it illegal to take their eggs.

No restriction was placed upon the capture of wild-fowl at any other time of year than that above specified, and man's ingenuity soon contrived a mode of making amends in winter for the opportunities lost in summer, by taking in decoys large numbers not only of the home-bred wild-fowl which had escaped destruction earlier in the year, but of the migrating flocks arriving at the commencement of the cold weather.

So far as can be judged from imperfect descriptions, the form of decoy (introduced into England, it is said, by Sir William Wodehouse in the reign of James I.) was probably much the same as that used at the present day, allowing for certain modifications and improvements which time would be sure to develop.[3]

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[3] The practice is doubtless of Dutch origin; the word *decoy* being in fact a corruption of the Dutch *eende-kooi* signifying a "duck-cage."

For the benefit of those who may never have seen a decoy, it may be well, perhaps, to describe briefly its construction and management.

Imagine, then, a pool of a few acres in extent lying in a quiet out of the way spot, far from any high road, and if surrounded by trees all the better (see Fig. 1, in which we get a glimpse of a decoy pond as seen from a pipe).[4] Marshes by the sea, especially on the east coast, were found to be most favourable for such a purpose, since fresh-water pools in such situations at once attract foreign fowl coming in from the sea on their first arrival.

Having selected the pool, the next thing to be done is to cut the "pipes," as they are termed, up which the ducks have to be decoyed. These "pipes," which may vary in number according to the extent and shape of the pool, are simply net-covered ditches of a peculiar shape, something like a cow's horn; that is to say, wider at the end nearest the pond than at the other end, and gently curving throughout their entire length. The reason for having several such "pipes" to a decoy is that the fowl may be taken when the wind, no matter from what point of the compass, is blowing down the pipe towards the pond. The reason for making the "pipes" curved is that if they were straight, and the ducks could see the further end, they would at once suspect a trap, and never enter them (see Fig. 2, representing the mouth of a pipe).

Let us suppose, then, that three, four, or five such pipes have been cut. These are arched over at intervals with hoops of wood, or iron (if expense be no object), and over these is stretched a strong netting, which tapers gradually towards the far end of the pipe, and terminates in a sort of bag or purse in which the fowl are eventually taken (see Fig. 3). As it is absolutely necessary that the decoyman should be concealed from view of the ducks on the pool, a series of screens made of reeds, and set one behind another, are fixed at intervals along the side of each "pipe" (these are shown in Fig. 2, to the left). A few tame ducks, taught to come at a whistle to be fed, a few handfuls of grain, and a small fox-coloured dog, and the decoyman is ready to begin operations.

Selecting his "pipe" according to the direction of the wind, he throws a handful of grain over a screen into the pipe, and whistles. The wind carries the grain towards the mouth of the pipe, the tame ducks come eagerly to feed, and the wild ones getting an occasional

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[4] The three excellent illustrations of Decoys are from an article on "An East Anglian Decoy," by Mr. G. C. Davies, in the "Art Journal" for 1882.—Ed.

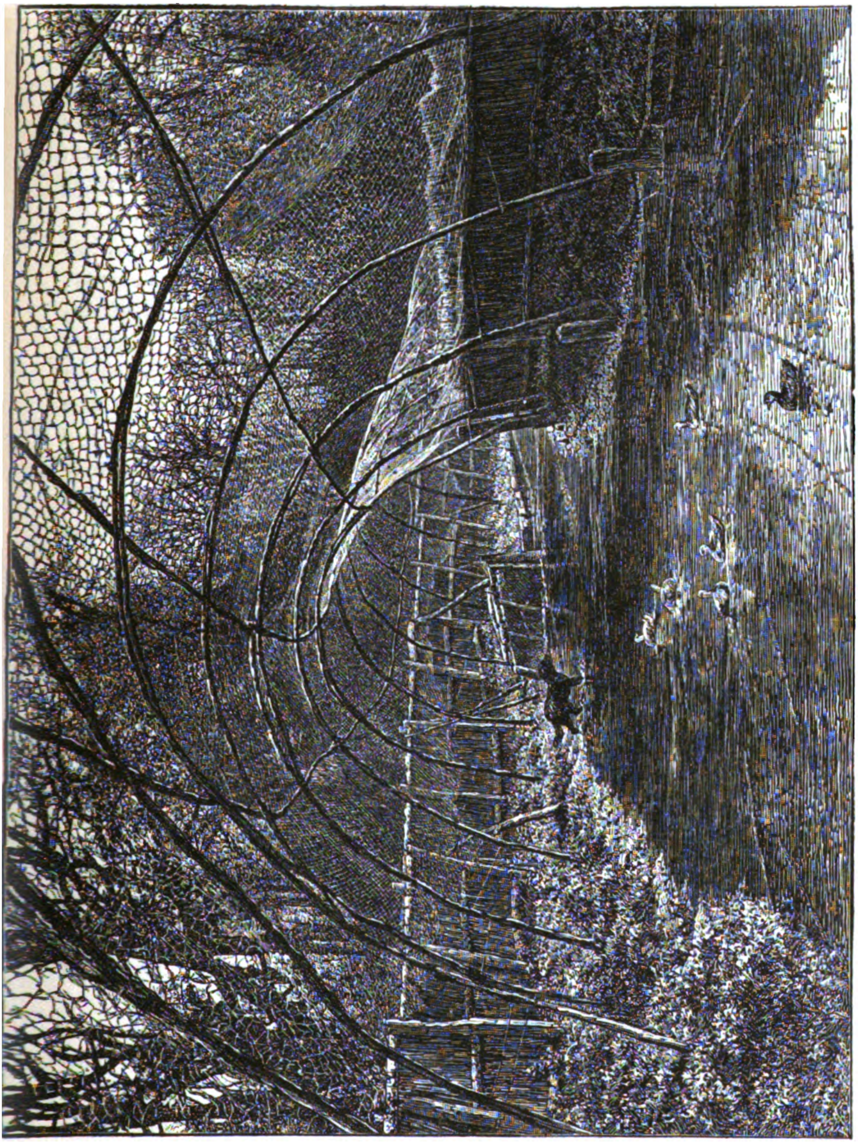

FIG. 2.—THE MOUTH OF A PIPE.

mouthful as the grain drifts by them or towards them, gradually discover that the nearer they swim towards the mouth of a pipe the more plentiful does food become. Unsuspectingly they enter the wide mouth, so wide as to convey no suggestion of a trap; and then the decoyman's little dog comes into play. Taught to dodge in and out of the reed screens to fetch a piece of bread or biscuit, he shows himself momentarily to the ducks in the pipe, and disappears when returning to his master. Wild-fowl are eminently curious, and their curiosity proves fatal to them. They behave towards the dog exactly as cattle would do—as long as he retreats from them they follow him. Perhaps from his colour they take him for a fox, their common enemy, and fancy they are driving him away. At any rate they follow him up the pipe until, having passed the first reed screen, they are virtually cut off from the rest of the flock. At this juncture the decoyman shows himself to the ducks in the pipe, though not to those on the pool. He makes no noise, but merely waves his arms, and the frightened fowl, afraid to return past him to the open water, instantly rise on the wing and fly up the pipe, following its curve in the vain hope that it will lead to freedom. Instead of that, however, it leads to the bag net; and the reason of there being no "hereafter" for wild ducks is explained by their having their *necks twirled* in this!

Such, briefly speaking, is the *modus operandi.* The whole business is conducted so quietly that the wild-fowl on the main water are never alarmed, and time after time the bag net is filled and emptied.

In hard winters when there may be several hundred ducks upon the pool in a day, great execution take place if the decoyman knows his work and has a good dog. At a celebrated decoy at Ashby, in Lincolnshire, which I visited in 1886, as many as 113 ducks have been taken *at one time*, and altogether 248 were taken there the same day.

At the present time, as above stated, there are existing in different parts of England about forty decoys which are still used, while as many as 140 others are known to have existed formerly, and to be now dismantled or out of repair. The counties in which the greatest number of decoys existed are, as might be expected from their situation, Lincolnshire (39), Norfolk (26), and Essex (29).

The position of those in *Essex* may be seen on referring to the map which I have prepared to illustrate these remarks (see Plate I.); the sites of former decoys being marked by a red spot, and the only three now existing being indicated by a small cross.[5]

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[5] We are indebted to Mr. Harting for a contribution towards the cost of this map, and also for having the red dots inserted at his own expense.—Ed.

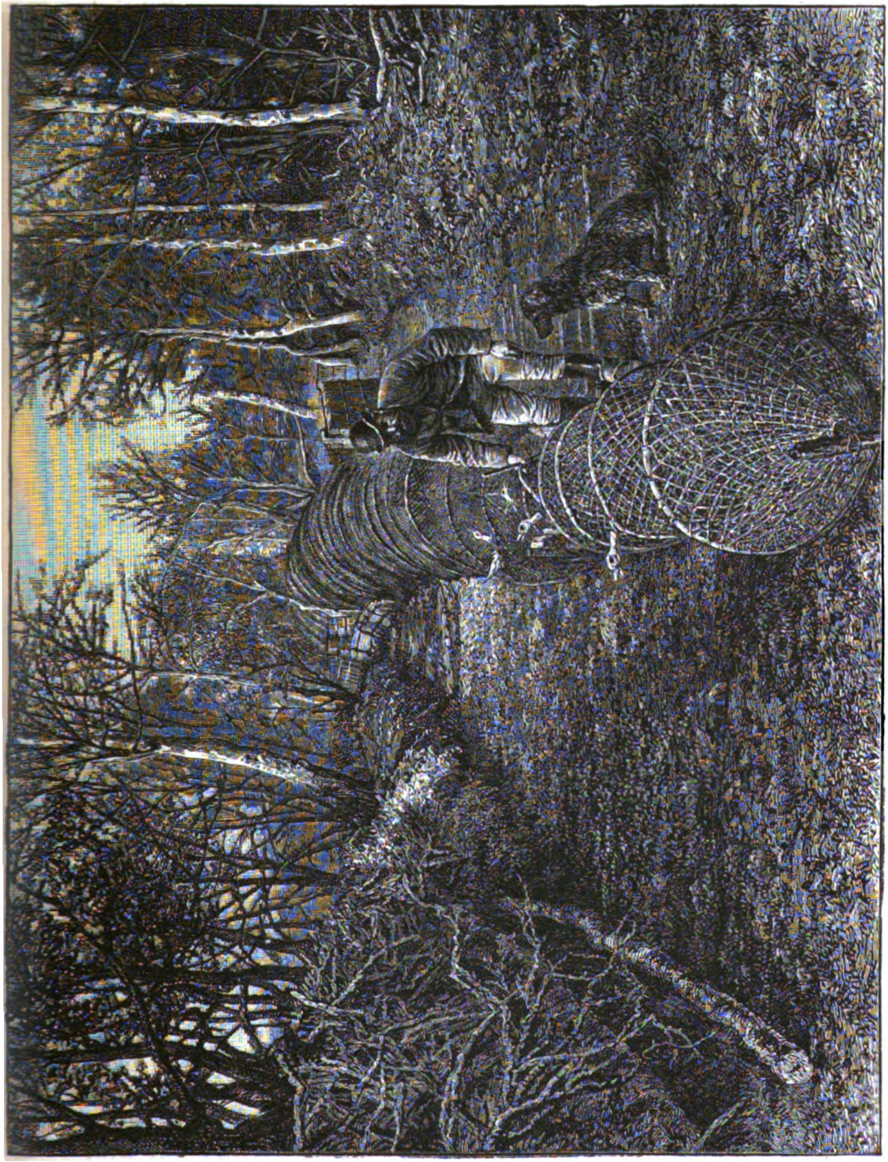

FIG. 3—THE END OF A PIPE.

I. *North of the Blackwater*, and between the Stour and the Colne, there were formerly no fewer than eleven, namely, Wormingford, Jacques Hall, Pond Hall, Old Decoy, Roydon Hall, Dovercourt, Great Oakley Hall, Old Maze Hall, Horsey Island, Villa Farm near Wivenhoe, and Lion Point, all long since abandoned.

II. *On Mersea Island*, between the Colne and Blackwater, was another. Then *on the north shore of the Blackwater* there were nine, namely, Tolleshurst D'arcy, Old Hall, Tollesbury, and Teal Pond. Goldhunger (2), Solleys, Gore, Skinner's Wick, and Bohun's Hall.

III. *South of the Blackwater*, and between that river and the Crouch, were eight others, namely, Latchington, Steeple, Ramsey, West Wick, East Hall, Glebeland, Marsh House, and Grange.

IV. *South of the Crouch*, and between that river and the Thames, there was a solitary decoy at South Hall, near Paglesham.

Of all these, three only are now existing and in working order, namely, Old Hall, Marsh House, and Grange, a sorry remnant of what was once a flourishing and lucrative business in the eastern portion of the county.

Those who have never seen a decoy worked, or examined the entries in a decoyman's account-book, would scarcely credit what an enormous number of fowl could be taken even on a small pool with only three or four pipes if properly managed. In 1886 I visited the Ashby decoy in Lincolnshire, where three thousand or four thousand birds used to be taken in a season, and in one year 6,059; and yet this decoy had only four pipes and little more than an acre of water.

Even a larger number of birds than this were captured in one season of five months (from September to January inclusive) in a famous decoy in Essex. This was Steeple Decoy, on the south shore of the Blackwater, where, in the very first year of its construction (1714) no less than 7,345 fowl were captured. Of these 675 were duck and mallard, 338 teal, 46 pintail, and 6,286 wigeon. These figures, with other interesting particulars, I extracted from an old account-book relating to this decoy in the possession of Mr. Robert Smith, of Maldon, who, on the application of my friend, Mr. Edward A. Fitch, very kindly allowed me to inspect it. The cost of constructing this decoy and subsequently of enlarging it (as appears by the book in question) amounted altogether to rather more than £300 (£306 14s. 4d.), while the selling price of fowl at that date was nine shillings and sixpence a dozen; so that, if all the birds captured in the first season had been sold at this price, the owners would have made enough to pay the whole cost of the decoy and have a profit in hand of £115.

As affording a good illustration of the prices paid for materials and labour in Essex in the days of Queen Anne, the first page of this M.S. is not without interest; and those who care for further information on the subject may be referred to the account which I have given of this book in the "Field" of July 5th, 1879, an account which has since been reprinted by Sir R. Payne Gallwey in his recently published "Book of Duck Decoys," wherein all the particulars which are now obtainable concerning the above-mentioned decoys in Essex, will be found.

"*Tempora mutantur et nos mutamur in illis.*"

The reclamation and cultivation of the marshlands, the formation of railways, the improvement in guns, and the great increase in the number of shooters, have each and all contributed to ruin decoys; while the large number of wild-fowl which are brought over from Holland and other parts of the continent every winter render it less than ever necessary for the owners of decoys in this country to incur the expense of maintaining them and paying the wages of a decoy-man. Moreover, in those counties where a large head of game is preserved, and large shooting parties are out during the winter months, "decoying" is out of the question, since absolute quiet must prevail within sight and sound of the decoy pond, or no ducks will stay to be caught.

Now that the number of decoys in Essex has dwindled down to one tenth of their original number, it is interesting to note their former abundance and local position, as well as the causes which have contributed to their gradual disappearance.

Hobby Catching a Swift.—On Tuesday evening (May 15th) I caught a Hobby which was feeding on a Swift. It is now in confinement and becoming fairly tame. The Swift was alive when picked up.—ROBERT BROOKS, The Maltings, Mistley, Essex, in the "Field," June 2nd, 1888. [The speed of the Hobby is very great compared with most birds. We have known one before now to catch a swallow, and a friend had a trained Peregrine Tiercel which caught a Swift.—ED. "Field."]

Musical Tastes in a Robin.—The following may interest some of the readers of the ESSEX NATURALIST; I have never heard anything precisely similar to it. For two successive days last week, while I have been playing the organ in the school chapel, a robin has come in through the open door, attracted, I can hardly doubt, by the music. The little bird, so far from being frightened, has come and sat on a choir seat behind me, at the distance of about three freet from my shoulder, and sang as if on a tree in the open air. The louder I played the more vigorously it sang, and apparently thoroughly enjoyed it; if ever I left off playing it ceased singing also. This went on for some twenty minutes each time. Occasionally it would fly down to the west end and then come up again and sing by my side. It would be interesting to know if such a taste for music has been noticed in these little songsters before.—FRANK B. ROGERS, Felstead School, Essex, October 7th, 1888.

Lathyrus tuberosus, L. in Sussex.—One of the few plants which Essex botanists have fondly claimed as peculiar to our county must, it seems, lose that title to our regard. *Lathyrus tuberosus*, the Peas Earth-nut, of which a coloured figure is given in Gibson's "Flora of Essex," has been found by Mr. R. D. Postans, "on the shingle beach at Eastbourne, in full bloom in the first week in August." Mr. F. H. Arnold has some interesting notes on this plant in the October number of "Science Gossip." He says:—"The locality in which the Sussex plant occurs, *i.e.*, the shingle beach at Eastbourne, differs greatly from that mentioned by Gibson, viz., in several corn-fields and also along the hedgebanks and borders of the same fields. The figure of this species as given in Gibson's 'Flora' is a good one, with the exception of the leaflets, which are represented as ovate, whereas they are obovate; but truer to nature than either the engravings of Gibson or Syme is the old woodcut of Gerard, headed '*Terræ glandes*, Pease Earth-nut,' while his verbal description, allowing for the absence of technicalities, is excellent. 'The Pease Earth-nut commeth vp with slender and weake stalkes: the leaues be thin, and little, growing vpon slender stems, with clasping tendrels at the ends, with which it embraceth and taketh hold of such things as stand neere vnto it: the floures on the tops of the stalkes are like to those of Pease, but lesser, of a purple colour, in smell not vnpleasant; in their places cometh vp long cods, in which are three or foure round seeds: the roots be thicke, long, like after a sort of acorns, but much greater, blacke without, gray within, in taste like to the Chessnut: out of which beneath doth hang a long slender string.' He mentions also that by the Dutch, the curious tubers are called 'tailed mise, of the similitude or likenesse of domesticall mise, which the blacke, round nuts, with the piece of the slender string hanging out behind do represent,' and to a dead and shrivelled mouse they have certainly a quaint resemblance. Gerard states that although this plant is common in Germany, he had not heard of its occurrence in England. [Gibson has an erroneous statement to the effect that Gerard mentions it as a native of England.] In Holland it is stated to be used as an esculent. We have now records of its occurrence in Essex and Sussex, but how it got to either of these localities, so far distant from each other, has not as yet been accounted for."

Colias edusa at Woodford.—As this butterfly appears to have been rare throughout the country during the past season, it may be interesting to note that I caught a specimen (a male) on Woodford Green, on September 7th.—(Master) WILLIAM S. ARGENT, Broomhill, Woodford, Essex, October 6th, 1888. [The "Clouded-Yellow" butterfly has been rare in almost all parts of England since the great *Colias* irruption of 1877. I well remember the immense numbers of the insects in the forest districts in August of that year. In a clover-field belonging to Dr. Sewell, at Woodford Bridge, the butterfly swarmed in an astonishing manner, and literally thousands might have been netted in a day. As the result of three visits to this spot my brothers and myself secured twenty specimens of the rare aberration "*helice*" of the female. The numbers of individuals of such insects as *Vanessa atalanta*, *V. io* and *V. cardui* in and about that field almost surpassed belief, and the spot presented a series of entomological pictures only paralleled in my experience by some of the rides in the New Forest in 1875, with their almost tropical garishment of hundreds of *Argynnis paphia*, *Limenitis sibylla* and other handsome butterflies. *Colias edusa* still frequented the neighbourhood until about the middle of September, and the last specimen noticed by us was on the 27th of that month. Since that time the only living example I have seen was one at Chingford, in August, 1886. The hundreds of thousands of the butterfly which must have flown in Essex in August and September, 1887, utterly disappeared at the end of the season, and left apparently no descendants to delight our eyes in future years. We have had many summers to our senses quite as suitable for the insect; the food-plant is grown in every parish; and stock nonsense about exterminating collectors cannot be imported into such a case as this. Yet so far as I know only solitary sporadic specimens have been seen in the county since the above mentioned memorable season. Few phenomena in the wonderful world of insects are more mysterious than this sudden appearance and disappearance of species of butterflies.—W. COLE.]

ESSEX HERONRIES.

By EDWARD A. FITCH, F.L.S., F.E.S., etc. (President of the Essex Field Club).

[*Read April 21st*, 1888.]

(With Plate forming the Frontispiece to the present volume.)

IN 1851, Mr. J. McIntosh contributed to Dr. Beverley R. Morris's Magazine, "The Naturalist" (vol. i., p. 60), a list of thirty-two Heronries in England and Scotland, which then were in existence. The list made no reference to Essex, but subsequently "H. J. C." mentioned the Wanstead Park Heronry (Nat. i., 163), and much additional information on British Heronries was contributed to the pages of the above mentioned periodical; so that in the Rev. F. O. Morris's "British Birds" (vol. iv., 96) we find a list of eighty-four British Heronries; viz., 68 in England, 5 in Wales, 9 in Scotland, and 2 in Ireland. In Mr. J. E. Harting's important paper on British Heronries ("Zoologist" for 1872, pp. 3,261—3,272) no less than 130 Heronries are noted for England and Wales, 70 for Scotland and 49 for Ireland. In an appendix (Zool., 1873, pp. 3,404—3,407) 20 are added for England and Wales, 2 for Scotland, and 3 for Ireland, and in subsequent volumes of the "Zoologist" mention is made of 21 additional Heronries in England and Wales, and 5 in Ireland; making altogether 300 in the United Kingdom. The only references to Essex are:—"One in Wanstead Park, on elms and wych-elms (Lord Cowley). Twenty years ago the herons here tenanted some trees at a different spot in the park. They now occupy some tall elms and wych-elms upon an island in the largest sheet of water. When I visited the place last there were about thirty pairs of birds. There is another Heronry in this county, near Chelmsford, the seat of Sir John Tyrell" (Zool. 1872, page 3,163).

Mr. Harting's prefatory remarks in his paper on these interesting bird-colonies are so pertinent that I cannot do better than introduce them here (with the author's permission) to his fellow members of our Field Club. He says:—

"To the archæologist no less than to the naturalist, a Heronry is always an object of interest. The sight of a heron reminds one of a hawk, and recals to mind the days when our ancestors rode forth with hooded falcons on their fists, and all the accompaniments of bells and jesses, gloves and leashes, lure and cadge, to fly at the largest, and withal the most crafty, of British wild-fowl. This ancient pastime has marked the heron as a bird of no common interest, and has consequently invested his dwelling-place with a charm which attaches to that of no other species, unless perhaps to the eyrie of his enemy, the noble falcon. Fortunate are those who can boast the ownership of a Herony, and watch from their casement the great grey forms of the herons passing silently to and fro, like some old retainers attached to the family for generations, and inseparably connected with it. The man who would wilfully cut down and destroy a Heronry would surely commit a crime. He would deserve, like the evil-doers of old, to be turned into a bird of ill-omen, and haunt the scene of his evil deed, bewailing it for all time. Let us hope there are none such. Modern statistics would certainly seem to show that Heronries in Great Britain, instead of decreasing in number as some have supposed, are steadily on the increase, and this in spite of the persecution which the birds are subjected to at the hands of fish-preservers and prowling gunners."

Judging from my Essex experiences, I fear that Mr. Harting should have added "game preservers" to the list of the enemies of the herons; the good old days when herons were protected to afford amusement to falconers have passed away, and the birds now suffer deadly persecution for disturbing, if not destroying, pheasants and partridges. As late as the year 1831 it was penal "to shoot with any gun within 600 paces of any heronry" (1st James I., c. 27, s. 7), and "no person without his own ground shall slay, or take by craft, or engine any herons, except with hawking or long-bow, on pain of forfeiture for every heron 6s. 8d.; and no person without his own ground shall take any young herons out of the nest, without licence of the owner of the ground, on pain of forfeiture for every heron 10s." (19 Hen. VII., c. 11, s. 1). Still further, it was enacted that "from first of March to the last of June yearly no person, without licence of the owner of the ground, on pain of forfeiture for every heron 10s." (19 Hen. VII., c. 11, s. 1). Still further, "from first of March to the last of June yearly no person shall withdraw, take, destroy, or convey any eggs or wild-fowl from or in any nest where they are laid, on pain of imprisonment for one year, to forfeit for every egg of any crane or bustard, 20d.; and for every egg of bittern, heron, or shovelard, 8d.; and for every egg of mallard, teal, or other wild-fowl, 1d." (25 Hen. VIII., c. 11, s. 5). These sections all remained in force until they were repealed by the Game Act of 1st and 2nd Will. IV., c. 32. The Act of 8th Elizabeth, c. 15, for the "preservation of grayne" and destruction of birds and vermin (quoted in full in the "East Anglian," vol. iii., pp. 275—9), was not "in any wyse to extend . . to the dysturbance, lett, or distructyon of the buyldinge or bredinge of anye kinde of hawks, herons, egrypts, &c."

In those days of protection, doubtless, heronries were fairly common in this county, with its vast expanse of mud-flats, tidal creeks, and sheets of inland water contiguous to its great woodlands, but I find but few references to them. The names of the parishes of Henham and the Hennys may have some reference to this bird. Herongate (East Horndon) certainly has; also the manors of Heyrons, or Heyronys, or Hewes, in Danbury; of Hayrons, or Hyrons, in High Easter (spelled Herons in Norden's map); of Hayrons, in Althorne; of Herons, in Fyfield; of Heron, or Herne, in East Horndon; of Heyn's Green, in Layer Marney; and, more doubtfully, of Ernis's, or Erins, in Hatfield Peverel. The name of the ancient manor of Ardern Hall, in Horndon-on-the-Hill, is very suggestive. One of the bounds of the borough of Maldon, mentioned in the charter of Henry II. (1155), is Buherne, probably meaning the protected heronry, or the heron's habitation. The presence and association of the Heron family has previously been referred to (ESSEX NAT., i., 142); the Henshaws were also connected with Essex; and the crest of the Haines', an important Essex family, is "a stork rising proper"—perhaps more correctly, a heron. The Heron and Herne families, also, bore herons in their arms.

To return to more certain ground. In Norden's description of Essex, written in 1594, we find "Towlshunt Darcye. Nere w$^{ch.}$ is a fayre heronrye" (Camden Soc. ed. p. 26). To this Heronry I can find no later reference; it certainly does not exist now. Dr. J. H. Salter, of D'Arcy House, Tolleshunt D'Arcy, a first-class sportsman, writes me, "There are no solitary nests of herons hereabouts, and there have been none during my residence here—about 24 years."

The two extinct Heronries at Belhus, Aveley, and Heron Hall, East Horndon, mentioned by Morant in his "History of Essex" (1768), are fully alluded to in a note I contributed to the ESSEX NATURALIST (i., 142); I can add nothing further.[1]

I have visited the disused Heronry at Mucking, but have no information further than that already given (ESSEX NAT., i., 142). I have also been over the site of a Heronry in Mersea Island. This was in Bower Hall Grove, which was stubbed up by Mr. Thomas Harvey about forty years ago; an ancient inhabitant told me there were usually from twelve to fifteen nests, and occasionally twenty; I cannot learn that herons have built on the island (a very likely place) since this grove was stubbed. In Durrant's "Handbook for Essex" Mr. Miller Christy says, under Goldhanger (p. 108),

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[1] The Belhus Park Heronry is referred to in Palin's "More about Stifford," p. 98. The East Horndon one in Wright's "History of Essex" (vol. ii., p. 550).

"here is a Heronry and also a wild-fowl decoy." From enquiries made I think this is certainly an error; no heronry has existed there of late years; the decoy has been disused for just over twenty years, and although it looks like a tempting place for a heron's nest, no birds have occupied it for breeding purposes. I have seen or heard of solitary herons' nests at Stony Piece, Lawling Hall, Latchingdon; the Nursery, Bradwell Glebe; the Old Farm (Dunmow Wick), Burnham; Mundon Furze (see ESSEX NAT., i., 142); Steeple; Scots Grove, opposite Guisnes Court gate, Tollesbury; the Great Wood, Tolleshunt Major; Barton Hall Wood, Great Stambridge; and Mr. Alfred Smee in "My Garden" (p. 530) says "I have seen a nest at Chigwell, in Essex."

Herons, heronshaws (the name used by Chaucer, Spenser, Shakspere, etc., corrupted by East Anglians into "hances"), moll-herns, frank-herons or franks (from its harsh fra-a-a-nk cry) are still common in Essex, especially in the neighbourhood of the coast; one day last July, while sailing up the estuary of the Blackwater from Bradwell to Maldon, I counted thirty-four herons as they were seeking food on the mud, and Mr. W. V. Legge ("Zoologist" 2nd ser. i. 92), says that he put up twenty-five at once, while out shooting in south-east Essex; but with the exception of an occasional solitary nest, the four Essex Heronries mentioned in the last edition of Yarrell's "British Birds," are, I believe, the only ones that have recently existed in the county, viz.:—at Wanstead, Boreham, Brightlingsea and Birch. Of these one is extinct (Brightlingsea), and another (Boreham) is doomed to disappear within a very few years.

The Boreham Heronry.—On March 16th, 1888, Mr. Reginald W. Christy and myself paid our first visit to the Boreham Heronry, by the permission of our High Sheriff, Lieut.-Col. J. L. Tufnell-Tyrell. This Heronry is not now in its old position; the birds used to build where the rooks do now, immediately behind Boreham House; but about seven years ago this colony became reduced to a single nest, and the old bird was shot while setting. In 1884 the herons first nested in West Mead Grove, a small grove planted as an apple orchard in 1842, and subsequently with oak, spruce firs, and a few miscellaneous trees, including some Scotch pines. The grove being only about 400 yards from the river, and about the same level, the soil is very wet, like all the grass land of the Chelmer valley, and consequently the apple trees soon cankered and died out, although one or two still remain, and the growth of the firs has been very slow. In company with the rooks, the herons have taken possession of these last named trees. In 1886 there were nine nests, but thirty young herons were destroyed in one day, and several more on other occasions. In 1887 the position was about the same, and although the persecution was continued, there appears to be the same number of nests this present year. The weather on the day of our first visit was very rough, and the ground had been covered with snow the day previously. We climbed up to three nests, but found no eggs, although the nest was freshly decorated with green twigs of spruce. We had an opportunity of seeing what a substantial platform of twigs and small branches the herons had constructed; Mr. W. Lines (the keeper) got well into two nests, and not only stood up on them, but, by stamping on them, gave the trees a good shaking; the nests apparently suffering no damage. We only saw one old heron, but were surprised at disturbing three or four moorhens from the herons' nests on the tops of the fir trees. We saw also a woodcock and a pair of wild ducks in the grove, besides quantities of game and rabbits.

On April 4th Mr. R. W. Christy and myself paid a second visit to the Boreham heronry. The extreme lateness of the season was evident in many ways—the blackthorn had hardly knotted for blossom, no buds were on the hawthorn, and even Wordsworth's "little celandine" (*Ranunculus ficaria*) was not in full bloom. The only spring signs were the hazel catkins, a few fairly green elder stubs, the bright red lime buds, and the leaves of the cuckoo-pint starting up on the hedge banks. Among the spruce firs we found the nine nests which the keeper, from having counted eighteen old birds about the grove, had led us to expect, but he said that he thought we were yet too early for eggs.[2] Three nests examined were empty, but the next ascent was rewarded by the discovery of five eggs in one nest, three of which were brought down; one, on being blown, proving to have been slightly incubated. We closely inspected every tree in the wood, but could only find three other unfinished nests. Although so huge, the nests in the thick spruce tops could not be readily seen from the ground. Knowing that the herons would not be protected, we returned to the only occupied nest, and brought down the other two eggs, which proved to have been longer incubated than the first three we had taken. The nest was a most substantial structure, and before descending after his third climb into it, Mr. Christy sat comfortably therein, while he lit his pipe, and took a last survey of the neighbouring tree tops. This nest was exactly four feet in diameter, and was composed of a great number of elder and thorn branches and twigs, with a few fir boughs; it was rather neatly lined with dock straw and spruce twigs, with more of the coarse grass and green twigs that we had found in other nests. Herons have been known to forcibly occupy rooks' nests, and battles royal have ensued in consequence; but when the colonies are once established rooks and herons appear to live peaceably together, although the egg-stealing propensities of the rooks have been known to introduce an element of discord.[3]

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[2] It is well known that the heron is a very early breeder. Mr. J. Young records ("Zoologist," 1884, p. 191) visiting a heronry on March 23rd, 1883, and finding that most of the nests contained young birds, while on February 23rd, 1884, by examining five nests in the same heronry, two were found to contain eggs, and three young birds. Mr. John R. Wise, in his "New Forest" (p. 309) however mentions an instance of a pair of herons laying at Boldrewood as late as June 23rd.

The Birch Heronry.—On April 16th of this year (1888) Mr. Miller Christy and myself visited the Birch Heronry. We were met at Kelvedon by Mr. C. H. Hills who drove us part of the way to Birch, and accompanied us to the spot. Thanks to Mr. William Smith, steward to Mrs. Round, every facility was given to us in examining this large and strictly protected heronry.

It was a charming summer-like day; a great change from the late wintry weather. Several hybernated butterflies were quite common. Many of the sallow-bushes in Pod's Wood were in bloom, affording a fine feast for the hungry bees; the pretty flowers of the wood sorrel were abundant in Conyfield Wood, Messing, and the wood-anemone was just coming out in the Birch Woods. When at Prested Hall, Mr. J. H. Hills told us that he had just seen a cuckoo, and we saw our first two swallows of the season flying in Feering churchyard.

The Birch Heronry is in the middle of an oak wood of about eighteen acres known as Calves Pasture, and it was indeed a most interesting sight. There was little or nothing to indicate the presence of the herons until we got well under the trees they occupied; then we saw them sitting upon the nests, and on the tops of the trees, or flying leisurely around in all directions. The birds appeared to be particularly tame, and were in no wise disconcerted at our presence; several were still building, and there were certainly no young, nor, possibly, any sitting birds. We counted 125 nests, and Mr. Henry Stephenson, the head keeper, told us that he expected at least 40 more would be built; he had seen over 300 birds about this year. All the nests were on oaks, and the largest number on one tree was eight. The usual flat platform of small branches and twigs was here lined with nettle-straw, not dock as at Boreham. It was quite astonishing to see what comparatively large branches the herons had broken off for building purposes. Mr. Stephenson was able to give us a complete history of this now extensive heronry, as it was he who found the first nest in Chest Wood, Layer-de-la-Hay, in 1861, on one of the tallest oaks, said to be nearly 30 feet to the first branch. The next year (1862) there were three nests, and they increased in numbers steadily every year until 1877 when there were about 100 nests in their first chosen spot, Chest Wood. In February, 1878, the herons came as usual to roost there preparatory to nesting; but shortly afterwards a pair of Peregrine Falcons appeared, and caused great alarm among the herons. One day, when on his rounds, Stephenson watched a heron high overhead apparently outsoar a peregrine, until both were lost to sight, but shortly afterwards heron and peregrine fell to the ground almost at his feet:—

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[3] See Dr. Heysham's account of such a battle at Dallam Tower, Westmoreland, in Bewick's "History of British Birds" (Ed. 1826, vol. ii., p. 11, note).

> "As when a cast of falcons make their flight
> At a wild herneshaw, tow'ring aloft on wing."

The peregrines were not shot, but the effect of their presence was that the herons entirely forsook Chest Wood for nesting purposes, and came to their present abode in Calves Pasture. That same year (1878) they built in the latter wood about 100 nests, and the colony has now increased to nearly 200 nests. No nest has been seen in Chest Wood since 1877, until last year, when a solitary one was observed. The birds are strictly preserved in every way and especially from the rooks, which are prevented from roosting in the wood as far as possible, being looked upon by the keeper as very destructive to herons' eggs, and he especially complained of their depredations among the early nests of this present year, during the severe weather of March.

In the account of the Kennel Club's Field-trials at Colchester in 1887 we read:—"We went on to some nice lucerne close to the Birch Heronry, possibly the largest in England, this season there being about 250 nests" ("Field," April 23rd, 1887, p. 565) This is certainly an error, the actual number of nests in 1887 being about half that mentioned.

Wanstead Heronry.—This heronry is in Wanstead Park, now forming part of Epping Forest, and under the control of the Corporation of London, acting as Conservators of the Forest.[4] Formerly the birds built on an island in the upper pond in the park, which consequently acquired the name of the "Heron Pond," but they now frequent "Lincoln's Island," and during the nesting season special precautions are taken by the Conservators to prevent the birds being disturbed. In "Science Gossip" for April, 1869, Mr. Harting gave an excellent account of his visit to this heronry, which we cannot do better than quote here. The description was reprinted in Mr. Harting's "Sketches of Bird Life" (1883), pp. 266-268 :—

> "The date of our visit was the 5th of April [1866], and the birds were then sitting on their eggs. The heron is one of the few waders which resort to a tree for the the purpose of nidification, and a stranger sight than a number of these great birds perched at the top of a lofty elm can scarcely be imagined. Twenty years ago the herons at Wanstead Park tenanted some trees at a different spot to that which they now frequent. At present they occupy some tall elms upon an island in the largest piece of water in the park. The keeper informed us that there were about thirty pairs. We proceeded to the boat-house and, after baling out the boat, which was nearly full of water, steered for the heron's island. A good glass enabled us to see the birds very clearly, and most of them were in splendid plumage. The nests were placed at the very tops of the trees, and many of them were occupied by a sitting bird. Here and there a heron stood erect upon a bough, with head and neck drawn in, looking for all the world like a cold sentinel, with his bayonet between his teeth and his hands in his trousers pockets. As we approached the island several loud croaks were heard, and the sentinels took wing, the sitting birds being the last to leave. Taking it for granted that the bird which sat the longest was the most likely to have eggs, we selected a tree from which a heron flew as we reached it.
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> "It was a wych-elm, about forty feet high, and the nest was placed amongst the topmost branches. After a fatiguing climb, owing to the absence of boughs for a considerable distance, we reached the top, and paused to rest before looking into the nest. And now was the anxious moment. Were our exertions in vain? Was the nest empty? or were we to be rewarded with the sight of eggs? The nest was large enough to sit in, composed externally of large twigs—chiefly elm and willow—and lined with smaller twigs, fibre, and dry grass. It overhung our heads to some extent, so that we were obliged to pull away a portion of the side before we could see into it, when, to our delight, four beautiful eggs were displayed, their bright bluish-green colour contrasting well with the dark fibre on which they were laid. The wind blew in gusts, and it was no easy matter to get them down safely; but at length we succeeded in getting them into our handkerchief, and, holding the ends together in our mouth, brought them down without a crack. They were considerably incubated, showing that they had probably been laid about the end of the third week in March."

In Mr. Buxton's "Epping Forest" (first edition, p. 97) we are told that the birds come to the heronry at the end of January or beginning of February, "and at once begin building operations. The old nests seem to require little repair. About fifty birds came to the trees in 1883; by the 6th of March, 1884, forty-three were counted, and there were probably more." At the meeting of the Club in the Park on April 21st, 1888, Goddard, the keeper, stated that in 1887 thirty-eight nests were counted, and that during the present spring he thought there were more. It was satisfactory to learn that the free admission of visitors to the park (excepting that the path by the lake is closed in May and June during nidification) has not apparently resulted in any injury to the heronry, and, contrary to the common opinion, the numerous rooks on the island appear to dwell in friendly relations with their long-legged neighbours.

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[4] See report of meeting of the Club at Wanstead Park, *ante*, page 79.—ED.

A sketch of the Wanstead Heronry is introduced in Seebohm's "History of British Birds" (vol. ii., p. 472), and by the kindness ot Mr. Harting I am able to present to the readers of the ESSEX NATURALIST a reproduction in lithography of a drawing of this heronry made by Mr. C. Whymper in 1885. This drawing forms the frontispiece to the present volume of the ESSEX NATURALIST.[5]

Brightlingsea and St. Osyth Heronries.—In Yarrell's "British Birds," and other works, mention is made of a heronry at St. Osyth, but this appears to have been a mistake; the only heronry in the neighbourhood was one just over the arm of the Colne estuary at Brightlingsea. So far as I can learn there never was a heronry at St. Osyth, although as shown further on there is some hope that this defect may be speedily rectified. On the morning of April 19th, 1888, Mr. W. H. Harwood and myself visited the site of the Brightlingsea Heronry, which is now tenanted by rooks. It is a most secluded spot on the Wyvenhoe side of the twenty-seven acre grove, on Mr. Bateman's estate, known as Heronry Wood, a little more than a quarter of a mile west of Brightlingsea Church. Mark Gooch, the old keeper, told us that formerly the heronry certainly contained over a hundred nests, but that forty-three or forty-four years ago the largest trees were felled, and this seriously diminished the numbers of the herons; then the rooks came, and they and the herons "used to fight alarming." Gooch and another old resident said that the rooks took large numbers of the herons' eggs. This, and their persecution by the tenant of the farm which encircled the heronry, who used to shoot the herons at breeding-time (much to the annoyance of his landlord), combined with a second fall of timber about twenty years ago, drove the herons away. In 1870 there were about thirty nests, which had been the average number for several years, while Mr. Frank Eagle farmed Brightlingsea Hall; in 1871 there were only fifteen or eighteen, and the herons finally deserted the spot in 1872. Both our informants agreed that as the rooks increased the herons decreased, and finally left the rooks masters of the grove. It was said that they went towards the Manningtree river, the Stour, and we were told that most of the birds now visiting the creek at Brightlingsea fly northwards. Possibly the colony migrated to Orwell Park, Suffolk, at the time the birds from Woolverstone Park did the like, about the spring of 1871, according to Mr. Harting ("Zool.," 2nd ser., viii., 3,406). Mr. John Bateman, the respected owner of the estate, however, is of opinion that the migration was not to the north, but "to Birch Hall heronry, which has become much strengthened, and to St. Osyth Park, where a small heronry has been started in Nun's [or Nunn's] Wood."[6] Mr. Bateman very feelingly writes to me: "Having promptly got rid of the 'heronicide' tenant [alluded to above] in 1872, I did all in my power to induce the herons to re-settle. They have tried over and over again, but have always been beaten by the rooks, who have now taken possession of the western end of the wood as well as the eastern, and trebled their numbers." Mr. Bateman adds that he never allows a shot to be fired at a heron in Brightlingsea, the birds being frequently seen in half-dozens together in all parts of the parish; he fears, however, "that it is a case of George III. and the American colonies over again—conciliation has been tried too late."

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[5] Since this paper was written, Mr. Miller Christy has informed me that about five years ago several pairs of herons (doubtless a party from Wanstead) came and built in the trees round the ornamental water in the grounds of GIDEA HALL, ROMFORD. It was a very dry summer, and the water being very low, the herons were fast exterminating the fish, when the owner had them shot. None have built there since. Probably Mr. Christy will give more detailed information in a separate note.—E. A. F.

As hinted above, we may hope that a heronry at St. Osyth will not long remain a myth. Hearing lately from Mr. Robert Cross, of Hill House, St. Osyth, that a few herons were breeding this year in Nunn's Wood, St. Osyth, I wrote to Sir J. H. Johnson, the owner of the Priory estate, for some particulars, and he has kindly replied as follows:—"Herons resort in great numbers to my ponds to fish. I have put up twenty or thirty at a time. Five or six years ago a

[6] In the late Mr. J. Yelloly Watson's "Tendring Hundred in the Olden Time," we read (p. 130) that "a heronry existed in Thick's Wood from time immemorial, but the herons took their departure a few years ago."

solitary pair came and built on a tree on an island in one of my ponds; then one or two more pairs came and built on another tree—and two years ago a pair built on a low tree in my little wood closely adjoining. I believe they are all again building there this year. I hope so, and I have given particular orders that they are not to be disturbed or molested; but my rooks behave very badly to them, and being excessively numerous (we killed over a thousand young ones last year), they harass them a good deal." On the 10th of May, Mr. Robert Cross communicated to me the welcome intelligence that this present year there were five nests at St. Osyth.

Thus under the protective care of Mr. John Bateman and Sir John H. Johnson we trust the glory of the departed heronry may speedily return to Tendring Hundred.

The conspicuous appearance of the heron when feeding, its deliberate, heavy and apparently, though not really, slow flight, with its long legs outstretched and its long neck drawn in, and its lengthened high-pitched "craick," are well known to most Essex residents, but from what I could see and hear the breeding homes of the heron are not so delightful. As soon as the young are hatched the noise and smell are quite too much. Landbeck says of a heron colony on the Danube, "that the ground, grass and low bushes were, at the time we visited the island, so covered with the excreta of these birds as to resemble a mass of snow at a distance; round about the trees the earth was strewn with broken egg shells, rotten fish, dead birds, *débris* of nests and other filth; and the stench in the neighbourhood of this place rendered our stay almost unbearable. . . . The clamour in these breeding places is so tremendous and singular in its character as almost to defy description; it must be heard before a person can form any idea what it is like." (Dr. A. E. Brehm's "Bird-life," p. 342.) The same characteristics obtain, though in a lesser degree, in Britain, and whoever visits a heronry for the first time cannot fail to be struck with the sight, not only of the heronry itself with its huge platforms of twigs, the incessant snapping and chuckling of the young, and the hoarse croaking of the old birds, but perhaps more particularly with that which meets his eyes and nose under the trees. The excreta and "castings" of the birds are enormous; the former more resembling that of a cow than a bird, and the "pellets" or "castings" are like small cricket-balls. The remains of fish, and ofttimes dead birds, in various stages of putrefaction, under the nests, do not add to the beauty or salubrity of the spot; when the parent herons drop any food intended for their young, they do not attempt to recover it, indeed it would be a hopeless attempt in most cases. Of the six pellets I brought home from Boreham at our second visit, four weighed just over three ounces and two just under, and the largest measured seven inches in circumference; they seemed to be composed almost entirely of water rats' fur most tightly felted together.

Pennant, in the account of his "Tour in Scotland," in 1769, mentions "the vast" heronry at Cressi Hall, six miles from Spalding, and tells us "the nests were so crowded together that myself and the company that was with me counted no fewer than eighty in one tree (*l.c.* p. 12). This *must* have been a big tree; our Essex spruces will hardly bear one nest. We are told that the weight of the young herons in their nests in summer (and of the nests themselves when loaded with snow in winter) was very destructive to the trees, and many tops were thus broken off. I saw and heard very good evidence of this.

Col. Montagu tells us that he "once saw a heronry on a small island in a lake in the north of Scotland, whereon there was only one scrubby oak tree, which not being sufficient to contain all the nests, many were placed on the ground" ("Dict. Brit. Birds," p. 172). The heron sometimes also breeds on precipitous rocks. In the "Field" for August 14th, 1886 (p. 274), Mr. W. R. Ogilvie Grant gives a most graphic account of how he obtained for the Natural History Museum at South Kensington a nest containing three almost fully-fledged young birds from the top of a spruce, seventy feet from the ground, on the slope of Turlem, Strathearn, Perthshire, said to be the highest pine-clad hill in Scotland. Mr. Grant also shot the parent birds, and it is from this attractive and life-like family party as "set up" in the Museum, that the accompanying illustration (page 183) was drawn by Miss Maud M. Clarke. The engraving originally appeared in Mr. R. Bowdler Sharpe's interesting paper on "Ornithology at South Kensington," in the last Christmas number of the "English Illustrated Magazine."

The heron was not only protected for sporting purposes in the days of old, but was also esteemed as a great delicacy for the table; this is very evident from the records of ancient feasts that have been handed down to us. One of the most remarkable was that mentioned by Leland, who tells us that at the feast given

A GROUP OF HERONS IN THE BRITISH MUSEUM OF NATURAL HISTORY.
Engraved by H. Fitzner Davey, *from a Drawing by* Maud M. Clarke.

on the enthronisation of George Nevill, brother to the celebrated Earl of Warwick, as Archbishop of York, in 1464, no less than 400 "heron-shawes" were served up. Their usual price appears to have been "xiid." Into the vexed question of their suitability for the table I will not enter further than to say that reports on the subject vary: one person will tell you that they are very good, much resembling hare; while another will denounce heron as worse than an old Scoter. For many years past Mr. James Round, M.P., has had a young one from the Birch heronry cooked, but how I cannot say. Mr. James Smail, in an interesting paper on "Herons and Border Heronries" (Hist. Berwickshire Nat. Club, 1882-4, p. 331), says of herons' flesh that, "Even when plump, and dressed and roasted to perfection, it is so fishy in flavour that eating of it would turn almost any stomach of the present day. But the young birds taken from the nest and properly stewed are really good; I have seen them at table repeatedly. Old birds should perhaps be *buried* for a few days before being roasted. In our Western Isles the cormorant is used for soup—and it makes excellent soup—but the bird is buried for a few days before boiling."

The heron is a very voracious bird, and is almost omnivorous. In Mr. F. Norgate's collected notes on the food of birds we read ("Zool.," 1881, p. 410):—"Heron: Fish, reptiles, small mammals and birds (Yarrell); frogs, water-beetles, boat-flies, water-rats, and especially pike fry and eels (Stevenson); feeds its young with eels; these and pike seem to be about the most destructive fish we have in our British fresh-waters (Norgate); the heron also devours young wild ducks, and will take young moorhens from the nest (Harting)." Mr. McIntosh says (Morris's "Naturalist," i., 61):—"The heron is not at all particular as to its 'bill of fare,'—toads, frogs, snakes, mice, fish of all sorts and sizes (we once watched a heron standing in a shallow part of a lake seize and devour in the short space of half-an-hour six good-sized carp), water-newts, and the roots of aquatic plants, as *Caltha palustris*; also the flowers of *Sparganium*." Mr. Wm. Lines (Col. Tuffnell-Tyrell's keeper), who kept two herons for over a year, tells me that they fed readily on any animal food offered them, which mostly consisted of keeper's refuse, but that they especially liked rat and rabbit. In the West Mead castings rabbit-fur was certainly evident, in fact those pellets examined at our first visit seemed almost entirely composed of rabbits' and rats' (mostly water-rats') fur. Mr. T. E. Gunn says ("Zool.," 2nd ser., xi., 4,790):—

"In dissecting a heron I found in its stomach an old cock blackbird, almost entire and partly decomposed, and a water-rat minus the tail. Having kept the heron in a state of domestication, I am aware it will refuse scarcely anything at all resembling food; one I had about two years ago would swallow almost anything offered it—small birds (both alive and dead), mice, rats, pieces of animal flesh, bits of leather, boot-laces, paper, string, etc. Mr. Johns ("British Birds and their Haunts," edit. 1862, p. 407, *note*) mentions a tame heron which was wont to perch on an old carriage-wheel in the corner of a court-yard, and to lie in wait for sparrows and martins. Dr. P. Neill, of Cannonmills, near Edinburgh, had a pair of tame herons, "which he found devoured the young of the moorhens which built and reared their young on an old willow stump that had fallen into the pond" ("Nat.," i., 61).

Many instances of the boldness of herons in attacking their prey are recorded. Mr. Wood, of Admiston Hall, Piddletown, Dorset, was about to pick up a snipe he had shot, "when a heron, which he had not previously seen, pounced upon it, shook it in his bill like a dog with a rat, evidently not satisfied that it had received its death-blow, and was just about to make a mouthful of the said snipe" ("Naturalist," i., 61). Mr. A. J. Clark-Kennedy in January, 1875, near Snape, Norfolk, saw "a heron strike down a dunlin as it rose from a ditch, and, having disabled it, was flying off with the unfortunate bird when a man on the other side of the river shouting out caused it to drop its prey, which he secured for himself. On the next day, and near the same place, another—or perhaps the same—heron, while flying slowly along the river bank, suddenly darted at and seized a snipe as it was flying quickly by, and carried it off in triumph" ("Zool.," 2nd ser., 4341). Mr. Harting relates ("Sketches of Bird Life," pp. 261–9) how a tame heron killed and subsequently pouched a predatory rat, and figures a heron whose great inclination to attack his red setter dog cost the bird its life. One of my men once saw a heron catch a starling and fly off with it.

With many sportsmen the heron bears a bad reputation, as indeed does every flying or creeping thing that may rightfully or wrongfully be suspected of interfering with their own pet "sport." In a late number of the "Field" we read:—"Herons, too, are a perfect nuisance in this neighbourhood. They seem of no manner of use, and are far too shy to be of any value as an ornament. I hardly pass a day on the river without seeing many fish, some up to 1-lb., with an ominous white spot, sure sign of the heron's stab, etc." ("Field," March 24th, 1888, p. 418.) It is for such delinquencies, real or supposed, that the heron is now often ruthlessly persecuted, and its conspicuous appearance renders it, of course, especially attractive to every "pot-hunter" and shore-shooter—races of sportsmen ever on the increase. But all members of our Club will join with me in hoping that this beautiful and interesting bird will, especially in its breeding colonies, continue to be protected by all lovers of Nature, and by many landowners and others who are not afflicted with that utilitarian craze which seems to be now so fashionable.

[The Club is much indebted to Mr. Fitch for defraying the cost of the plate of the Wanstead Heronry forming the frontispiece to the present volume of the ESSEX NATURALIST, and also for the electrotype of Miss Clarke's drawing from the "English Illustrated Magazine."—ED.]

Sphinx convolvuli in Essex.—In the "Entomologist" for September, Mr. Thomas Bell, of "Oakwood," Epping, records the capture on August 15th of a specimen of *Sphinx convolvuli* in his garden—the first he had seen this season.

The Diptera of Epping Forest.—Nearly a twelvemonth ago the Editor of the ESSEX NATURALIST asked me to compile a list of the Diptera that had been taken in Epping Forest, but owing to the pressure of other work, I have found it impossible to attack the subject up to the present time. However I hope shortly to be able to compile a preliminary list of the species inhabiting the district, and to this additions can be made from time to time. Very important assistance could be rendered me in this task if Entomologists collecting in the forest would take *all* the Deptera they notice, and forward them to me pinned, all labelled and dated, but *unset.* As many species of Diptera are excessively common, and can be taken by scores by "sweeping," there should be no difficulty whatever in obtaining a considerable number of specimens. I may mention that it is always desirable to take *all* the specimens that present themselves, as to even a competent Dipterologist it is impossible to recognise at the time of capture more than a small proportion of examples taken. By following this advice, closely allied species are obtained, and the list will be much more complete and reliable, as I wish to add particulars as to the rarity, times of appearance, and any notes of interest, to as many species as possible. Low creeping plants, ditches, grass, hedges, bushes and shady glades, as well as sunny banks and flowers, are always most productive, and on every warm day from sunrise to sunset Diptera may be taken in abundance. I shall be glad to give any further hints or details of collecting to any one addressing me by letter, as, owing to my time being so much occupied in London, I am relying principally on the assistance of my brother Entomologists to enable me to carry out the task of compiling this list.—E. BRUNETTI, 129, Grosvenor Park, Camberwell, S.E. [We sincerely hope that our collecting members will give Mr. Brunetti all the aid in their power. Any one who can use a net and collecting bottle could render valuable assistance, but it is most important *that the place and date of capture be attached to each specimen.* Diptera can be killed by fumes of burning sulphur or strong ammonia, but on no account should the boiling water method of killing, so dear to coleopterists and hymenopterists, be adopted, as the hairs then tend to become matted together and thus renders the identification of closely allied species difficult. In the "Entomologist" for October (London: Simpkin, Marshall and Co., Stationer's Hall Court—6d.) Mr. Brunetti publishes some valuable hints on collecting Diptera with an account of the British Families, giving habits and places of occurrence of each, etc.—ED.]

FLINT-IMPLEMENTS AT WALTON-ON-NAZE, AND LEXDEN, ESSEX.

By HENRY LAVER, M.R.C.S., F.L.S., F.S.A. (Vice-President, Essex Field Club).

STONE Point, Walton-on-Naze, is that portion of Walton Hall Farm lying nearest Harwich, but separated from that place and Dovercourt by the creek known as Hanford Water. By recent inroads of the sea the banks protecting the marsh, together with a large stretch of cultivated land, have been washed away during the last few years, exposing some good sections of a large "Red-hill," or "Salting Mound," as these mysterious collections of burnt earth are termed by Mr. Stopes (see ESSEX NATURALIST, vol. i. 96).

My sons, Edward and Philip, have lately been exploring this locality, and have been successful in finding a considerable number of flint "flakes," "knives," "scrapers," an arrow-head, and one very fine polished flint celt.[1] All these were found near to the partially denuded "Red-hill," and had apparently been washed by the sea out of the soil of the marshes, removed by the action of the waves. It would appear from the number of specimens that the flakes and implements were manufactured on the spot, evidently from the water-worn flint pebbles so commonly found in the soil, not only of this locality, but also in all parts of the county where the soil is at all sandy.

Around the partially destroyed Red-hill are many fragments of coarse hand-made pottery, similar to those found and described by Mr. Stopes. All these fragments bear the impress of the fingers, showing clearly in what way the clay was pressed into shape. The locality is easily to be found by keeping to the path on the edge of the cliff, until a shed is reached at the back of the sea-wall on the low ground after passing over the hill. At low tide the red earth of the "Red-hill" will be seen in some slightly raised portions of the marsh remaining on the beach, and it is amongst the stones, bricks, and other wreckage at this spot, that the flints and other objects are to be found by close searching.

On August 8th, my son Edward picked up from the surface of the soil at the back of Lexden Park a well-formed flint scraper. Mr. Worthington Smith has kindly examined this implement, and pronounced it to be Palæolithic. It presents a very bleached appearance in consequence of the removal of the soluble portions of the silex. Mr. Smith describes it as follows:—"Ovate, with ogee-curved edges, cutting edge all round; white, slightly abraded, somewhat lustrous, slightly marked with ferruginous stains from contact with the iron of agricultural tools, exactly agreeing with the small white lustrous ovate implements found by Mr. B. Harrison, near Ightham, Kent. Length, 2⅝ inches; width, 1⅝ inches; weight, 1¼ oz."

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[1] These specimens have been seen by Mr. Worthington Smith, who confirms Dr. Laver's opinion that they are all of the Neolithic type.—ED.

The subsoil at the back of Lexden Park is composed of River-gravel and sand, and it would appear from the position in which the palæolith was found (at the base of the British or Roman earth-work) that it had been disturbed by the plough from the soil of this embankment, which is composed of the river gravel in or on which the implement had been deposited. It is probable that further examples exist in the locality, and attention is being paid to it with a view to their discovery.

Deilephila galii in Essex.—On the warm sunny afternoon of September 13th, as Mr. E. A. Fitch and myself were strolling round the shore of Osey Island, in the Blackwater estuary, Mr. Fitch's attention was attracted to some specimens of *Lycæna medon*, and while stopping to box one of the butterflies, he caught sight of a caterpillar of *D. galii* on a small patch of somewhat stunted *Galium verum* growing on the sloping bank of the higher land bordering the shore. Very shortly afterwards I found two other larvæ at the same spot. A careful search by Mr. Fitch and myself and brothers of the scanty patches of *Galium* along nearly the whole shores of the island, both on this occasion and again on September 16th, failed to reward us with further captures, although we observed traces of larvæ. Possibly we were too late for any but stragglers. Several captures of the moth and caterpillars in Essex this year have been recorded in the "Entomologist." At a meeting of the North Kent Entomological Society on August 2nd, Mr. Graham exhibited a fine specimen of *Deilephila galii*, which was knocked down by a boy with his cap at Silvertown, on July 23rd (H. J. Webb, Entom. xxi., p. 231). On August 2nd, Mr. P. J. Tudor records the capture of a specimen of the moth hovering over a geranium, at Buckhurst Hill (*ibid*, p. 231); and Mr. J. A. Cooper says that he took about a dozen larvæ from the sand-hills near Shoeburyness (*ibid*, p. 257). The larvæ have been taken by hundreds at Deal, and in smaller numbers on the Suffolk coast, also in Norfolk, Cheshire, etc. Indeed 1888 bids fair to become noted in entomological annals as a "*Galii* year."—B. G. COLE, Buckhurst Hill, October, 1888.

Acherontra atropos at Maldon.—On the morning of the Club's excursion on the Blackwater Estuary, September 15th, Mr. A. J. Furbank, the acting Town Clerk of the new Borough of Chelmsford, while on his way to join the party on the Hythe, found a fine dark specimen (male) of the "Deaths-head Moth" at rest on the pavement in the High Street, Maldon. The peculiar stridulating powers of the insect were fully in evidence, and were demonstrated repeatedly, much to the interest and amusement of the members assembled to embark on the "Rose." Mr. Furbank kindly presented this specimen to me, and it is now in our collection.—B. G. COLE, Buckhurst Hill, October, 1888.

CONTRIBUTIONS TOWARDS A LIST OF THE FUNGI OF ESSEX.—DISCOMYCETES.

By M. C. COOKE, M.A., LL.D., A.L.S.

[The present is the third contribution made by Dr. Cooke towards a complete catalogue of the Fungi of Essex. A list of the Hymenomycetes of Epping Forest, corrected up to the end of 1881, was published in the "Transactions," vol. ii., pp. 181—191, by Dr. Cooke, assisted by the late James L. English. (Many species have since been added to this list as the result of the various "Fungus Forays" and other investigations, and it is intended to print a revised list of the Hymenomycetes shortly.) To the Essex Naturalist, vol. i., pp. 184-186, Dr. Cooke contributed a "Preliminary List of the Microscopic Fungi of Essex—Ustilaginei and Æcidiomycetes;" whilst the present list comprises the species of the section of the Ascomycetal Fungi known as the Discomycetes. The list is, of course, very imperfect, but comprises all the Essex forms noted up to the present time. It is to be hoped that our botanical members will speedily make extensive additions to this division of our County Flora.—Ed.]

Discomycetes.

Morchella esculenta, L. Cooke, "Mycographia," fig. 312, 313[1]. On the ground. Audley End.

Helvella crispa, Fr. Cooke, "Mycographia," fig. 159. On the ground. Epping Forest.

H. lacunosa, Afz. Cooke, "Mycographia," fig. 160. On the ground. Monk's Wood.

H. elastica, Bull. Cooke, "Mycographia," fig. 163. On the ground. Birdbrooke; Epping Forest.

Leotia lubrica, Pers. Cooke, "Mycographia," fig. 171. In damp ground. Epping Forest.

Peziza (Acetabula) insolita. Cooke, "Mycographia," fig. 375. On dead leaves. Kelvedon.

P. (Otidea) onotica, P. Cooke, "Mycographia," fig. 210. Amongst leaves. Audley End.

P. (Cochlearia) aurantia, Œd. Cooke, "Mycographia," fig. 203. On the ground. Epping Forest; Chingford; Chelmsford.

P. (Discina) repanda, Wahl. Cooke, "Mycographia," fig. 240. On the ground, etc. Epping Forest.

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[1] Cooke, M. C., "Mycographia seu Icones Fungorum: Figures of Fungi from all parts of the World;" vol. i., Discomycetes, 1875-79.—Ed.

P. (Pustularia) vesiculosa, Bull. Cooke, "Mycographia," fig. 242. On manure heaps, etc. Epping; Chingford.

P. (Geoscypha) tectoria. Cooke, "Mycographia," fig. 263. On damp walls. Epping.

P. (Geoscypha) sepiatra. Cooke, "Mycographia," fig. 261. On damp ground. Epping Forest.

P. (Humaria) crouani. Cooke, "Mycographia," fig. 17. Amongst moss. Ilford.

P. (Humaria) rutilans, Fr. Cooke, "Mycographia," fig. 57. Amongst moss, etc. Epping; Chelmsford.

P. (Humaria) humosa, Fr. Cooke, "Mycographia," fig. 25. On the ground. North Epping.

P. (Humaria) granulata, Bull. Cooke, "Mycographia," fig. 59. On dung. Loughton; Chingford.

P. (Pyronema) pigottii, B. and Br. On plaster ceilings. Chelmsford.

P. (Pyronema) subhirsuta, Schum. Cooke, "Mycographia," fig. 66. On damp ground. Epping Forest.

Hymenoscypha (Sclerotinia) curreyana, Berk. On rushes. Chingford.

H. (Trichoscypha) coronata, Bull. On herb stems. Epping Forest.

H. (Cyathoidea) fructigena, Bull. On beech mast. Epping Forest.

Chlorosplenium æruginosum, Fr. On rotten oak branches. Epping Forest.

Helotium citrinum, Hedw. On dead wood. Monk's Wood.

Mollisia cinerea, Batsch. On dead wood. Epping Forest. Common.

Lachnea (Sarcoscypha) radiculata, Sow. Cooke, "Mycographia," fig. 99. On the ground, etc. Epping.

L. (Sarcoscypha) coccinea, Jacq. Cooke, "Mycographia," fig. 95. On twigs, etc. Epping; Chelmsford.

L. (Sarcoscypha) cocotina. Cooke, "Mycographia," fig. 356. On cocoanut fibre. Epping.

L. (Sarcoscypha) macropus, Pers. Cooke, "Mycographia," fig. 188. On the ground. Epping Forest.

L. (Sepultaria) hemispherica, Wigg. Cooke, "Mycographia," fig. 115. On the ground. Epping Forest.

L. (Rhizopodella) melastoma, Sow. Cooke, "Mycographia," fig. 103. On rotten sticks. Epping.

L. (Scutellinia) hirta, Schum. Cooke, "Mycographia," fig. 128. On the ground. Epping Forest.

L. (Scutellinia) scutellata, Fr. Cooke, "Mycographia," fig. 131. On rotten wood. Epping Forest.

L. (Scutellinia) stercorea, Fr. Cooke, "Mycographia," fig. 147. On dung. Epping Forest.

L. (Scutellinia) coprinaria. Cooke, "Mycographia," fig. 149. On cow dung. Loughton.

L. (Scutellinia) rubra. Cooke, "Mycographia," fig. 152. On spent hops. Ilford.

L. (Scutellinia) theleboloides, A. & S. Cooke, "Mycographia," fig. 151. On spent hops. Ilford.

Lachnella nivea, Hedw. On rotten wood. Epping Forest.

L. virginea, Batsch. On bark, wood, etc. Epping Forest; Monk's Wood.

L. apala, B. & Br. On dead rushes. Epping Forest; Chingford.

L. pteridis, A. & S. On dead bracken. Epping Forest.

L. hyalina, Pers. On chips. Epping Forest.

Tapesia rosæ, Pers. On *Rosa canina.* Epping.

Ascobolus furfuraceus, Pers. On old cow dung. Loughton.

Bulgaria inquinans, Fr. On dead beech trunks. Epping Forest; Chelmsford. Common.

Ombrophila sarcoides, Jacq. On stumps. Epping Forest; Chingford.

O. purpurea, Fckl. On stumps. Epping Forest.

Calloria fusarioides, Berk. On nettle stems. Epping Forest; Chelmsford. Common.

C. vinosa, A. & S. On rotten wood. Epping Forest.

Dermatea rhabarbarina, Berk. On wild rose stems. Epping.

Heterosphœria patella, Tode. On herb stems. Epping Forest.

Propolis versicolor, Fr. On decorticated wood. Epping Forest.

Phacidium ilicis, Lib. On holly leaves. Epping Forest.

P. dentatum, Schm. On dead oak leaves. Epping Forest.

P. coronatum, Fr. On dead leaves. Epping Forest.

Trochila craterium, Fr. On dead ivy leaves. Epping Forest.

Stegia ilicis, Fr. On dead holly leaves. Epping Forest.

A Swallow Bowled Out at Cricket.—During the cricket match played on the Felstead School ground, on Wednesday August 15th, between Charlton Park and Felstead Long Vacation Club, Mr. A. H. Pease, the slow underhand bowler of the Charlton team was tried, when he hit a swallow with the ball, killing it in the centre of the wicket. The ball was hit afterwards by the batsman and two runs scored. The bird has been preserved and is in the possession of the Charlton Park Club.

Nests of the Kingfisher, and Meadow Pipit (*Anthus pratensis*, L.)—Calling at Mr. Swaysland's establishment at Brighton the other day, he showed me two nests—a Kingfisher's and a Meadow Pipit's. The former he had cut out of the clay on the river bank at Henfield, and the soil being tenacious, the exact shape of the nest and tunnel thereto had been preserved, but the curious thing was that underneath the young Kingfishers which it contained were four fish, averaging from three to four inches in length. It is rather remarkable that the young birds did not mind their presence, for they were much too large for them to eat, but apparently Kingfishers are partial to an odour of decaying fish. The Meadow Pipit's nest was merely remarkable for being in an old tin kettle which had been thrown away on the Racehill, where it was found by a pair of Titlarks, who must have been very hard up to build in such a strange place.—J. H. GURNEY, Junr., F.Z.S., Keswick Hall, Norwich, September, 1888.

Black Redstart Nesting in Essex.—Mr. W. R. Ogilvie Grant, of the Natural History Museum, South Kensington, writes as follows to the "Zoologist" for October (vol. xii., 3rd ser., p. 390):—"The Natural History Museum has recently received an interesting acquisition in the shape of an undoubted nest, with two eggs, of the Black Redstart, *Ruticilla tithys*, taken in Essex. This is the first authentic instance, I believe, which has been recorded of this bird breeding in England. The nest referred to was presented by the Hon. Mrs. Ronald Campbell, who found it at Danbury Palace, Chelmsford, the seat of her father, the Bishop of St. Albans. She describes the circumstance of this interesting discovery as follows:—'The nest was in a hole in an ivy-covered oak tree, which is more like a wall than a tree, and stands a few yards from a dairy, in a dark sheltered corner. It was about four or five feet from the ground, and there were four eggs in it. The nest was found by some village boys who come to the dairy for milk, and their constant passing close to the nest must have caused the bird to forsake it. They showed it to my boys, and we watched it carefully, and saw the bird fly off twice—a dark-coloured bird with a red tail. This first made me think it was a redstart, as they abound about here; but I could not understand the white eggs. They were a delicate pinkish white before being blown, like pink pearls. The nest was built early in May. . . I am sorry one of the eggs was accidentally cracked. The other two were the same size as the cracked one. One of them was broken in the nest when we first saw it, and the other was given by my boys to a friend who had a good collection.' The egg which is not cracked is considerably smaller than the injured one, which, as stated above, was the same size as the two others. I hope to have the pleasure of exhibiting this most interesting nest and eggs at the next meeting of the Zoological Society."

GEOLOGISTS' ASSOCIATION.

UNIVERSITY COLLEGE, GOWER STREET.

(*Founded in* 1858, *to facilitate the Study of Geology and its allied Sciences.*)

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MONTHLY CIRCULARS are issued giving the details of the papers and excursions for the coming month.

SPECIAL PUBLICATIONS are also brought out. A general account of the excursions of the Association is in course of preparation.

THE LIBRARY is open on the evenings of the monthly meetings for the exchange of books.

MEMBERS (ladies or gentlemen) pay an admission fee of 10s., and an annual subscription of 10s. (the composition fee for the latter being £5 5s.) when they are entitled to receive by post the "Proceedings" and "Monthly Circulars."

B. B. WOODWARD, F.G.S, etc., *Secretary.*
23, BATOUM GARDENS, W.

THE EAST ANGLIAN;

Or, NOTES AND QUERIES on subjects connected with the Counties of

SUFFOLK, CAMBRIDGE, ESSEX & NORFOLK,

Edited by the Rev. C. H. EVELYN WHITE, F.S.A., F.R.Hist.S., Vicar of Christ Church, Chesham; Hon. Mem. (late Hon. Sec.) of the Suffolk Institute of Archæology and Natural History, etc.

Part I., commencing an entirely New Series of this well-known serial was issued 1st January, 1885, and is published monthly. Vol. II. commences January, 1887. Annual Subscription, 5s. Post Free. Single part sent on receipt of Sixpence in stamps.

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THE ESSEX FIELD CLUB.

NOTICES TO MEMBERS.

THE next ORDINARY MEETING (the 95th) will be held on SATURDAY EVENING, NOVEMBER 24th, when Prof. Meldola, F.R.S., will read a paper on "The late Col. Russell's Contributions to Photography," and make his Report, as the Club's Delegate at the British Association, on the work of the "Corresponding Societies Committee" of the Association.

Due notice of this meeting will be sent to Members in the usual way.

It is thought that the meeting will afford a good opportunity for an EXHIBITION OF PHOTOGRAPHS by various processess taken by members and others, particularly of ESSEX SCENERY, BUILDINGS, &c. The Secretary will be glad to hear from anyone willing to exhibit such views. It is hoped that all the photographical members of the Club will contribute.

NEW MEMBERS OF THE CLUB.—The subscription to the Club is 10s. 6d. per annum, with an entrance fee of 10s. 6d. Any information with respect to Membership, with copies of Rules, &c., will be gladly sent on application. *It should be remembered that candidates proposed during the remainder of the present year will pay only one subscription, which will clear them until 31st December,* 1889; the publications of the Club will be forwarded post free, to such members on and after the 1st of January next, but they can purchase all back issues at a reduction of 25 per cent. from the published prices.

SUBSCRIPTIONS.—Subscriptions (10s. 6d.) for 1888 *became due on January 1st,* and should be sent at once to the TREASURER, THOMAS ROYLE, Esq., "Dalton House," Upton Lane, Forest Gate, E. POST OFFICE ORDERS should be made payable at STRATFORD, E., and Cheques crossed "London and County Bank," Stratford Branch.

"THE BIRDS OF ESSEX."

Particular attention is called to Mr. Christy's request for information respecting specimens of Essex Birds in private hands, printed on page 2 of the wrapper of the present number.

The work alluded to will, under a special agreement with Mr. Christy, be issued as Vol. II. of the "SPECIAL MEMOIRS" of the Club, and by the terms of the agreement, copies may be subscribed for by members of the Club only, *at a very reduced rate.* The publication of the book will be dependent upon the number of subscribers' names received. A full prospectus will shortly be issued simultaneously by Mr. Christy to the general public, and by the Secretary to the members of the Club. It should be noted that only one copy of the work can be issued to each member at the special rate.

WILLIAM COLE, *Hon Sec.*

NOTE.—*The present number of the* ESSEX NATURALIST *consists of three and a half sheets, but the paper referred to on page* 160 ("*A Visit to an Essex Gullery,*" *by Messrs. Fitch and Christy*), *is unavoidably crowded out. It will appear, together with reports of the Meetings at Bishops Stortford and Maldon, in the next number. The* PLATE *of the* WANSTEAD HERONRY *was inadvertently bound up with the last part.*—ED.

S. 11 & 12, VOL. II.] *Price to Non-Members 2s. 6d.* [NOV. & DEC., 1888.

The Essex Naturalist:

BEING THE

JOURNAL

OF THE

ESSEX FIELD CLUB.

EDITED BY

WILLIAM COLE,

Honorary Secretary.

Contents:

PAGE

A Visit to an Essex Gullery, with Notes on the Birds Frequenting the Marshes round Tollesbury.—By E. A. FITCH, F.L.S., and MILLER CHRISTY 193

Notes.—Ice Crystals during Fog—COL. BRYDGES R. BRANFILL; Otter at Earls Colne 198

The Great Flood in Essex of August 1st and 2nd, 1888.—By D. RADFORD SHARPE, F.R. Met. S. (*illustrated*) 199

Notes.—Wren's Nest in a Dead Crow; The Tinamu in Essex—JOHN BATEMAN, J.P.; Badger Killed by a Train at Theydon Bois 205

The Essex Field Club.—Field Meeting at the "Grange," Bishop's Stortford, and in the River Stort District, July 18th, 1888 207

Modern Falconry.—By T. J. MANN 209

Indian Hawks and Hawking.—By CAPT. C. H. THOMPSON 217

The Essex Field Club.—Visit to Maldon and the Blackwater Estuary, September 14th and 15th, 1888 (*illustrated*) 229

Short Notes on the History of Maldon—E. A. FITCH 231

Notes.—*Colias edusa*—DARELL STEPHENS, F.L.S.; *Catocala nupta* with Black Underwings—H. LAVER, F.L.S.; *Atomaria linearis* destructive to Mangold—E. A. FITCH; Toper Shark at Clacton—H. LAVER; Reported Nesting of Black Redstart in Essex—MILLER CHRISTY .. 255

The Essex Field Club.—Cryptogamic Meeting, October 27th; Ordinary Meetings, November 24th and December 29th 257

Notes.—Grey Phalarope in Essex; Great Black Woodpecker—J. H. GURNEY, F.L.S.; Late Stay of Martins and Swallows; Otter at Stisted; Sand Grouse in Essex—E. A. FITCH, F.L.S.; Common Crane at Elmstead—H. LAVER, F.L.S.; Seals in Blackwater—E. A. FITCH; Black Tern at Waltham Abbey—Sir T. FOWELL BUXTON; Food of the Otter; *Lathyrus tuberosus* 270-2

The authors alone are responsible for the statements and opinions contained in their respective papers.

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[Ent. Stationers' Hall.]

SUBSCRIPTIONS FOR 1889 ARE NOW DUE; SEE FOURTH PAGE OF WRAPPER.

All Communications should be Addressed:—
The Editor of "THE ESSEX NATURALIST,"
7, Knighton Villas, Buckhurst Hill, Essex.

"THE BIRDS OF ESSEX."

Particular attention is called to Mr. Christy's request for information respecting specimens of Essex Birds in private hands, printed on page 2 of the wrapper of the last number of the ESSEX NATURALIST.

The work alluded to will, under a special agreement with Mr. Christy, be issued as Vol. II. of the "SPECIAL MEMOIRS" of the Club, and by the terms of the agreement, copies may be subscribed for by members of the Club only, *at a very reduced rate.* The publication of the book will be dependent upon the number of subscribers' names received. A full prospectus will shortly be issued simultaneously by Mr. Christy to the general public, and by the Secretary to the members of the Club. It should be noted that only one copy can be issued to each member at the special rate.

The work will probably make its appearance in the latter part of 1889, when it will fill a very obvious blank in the valuable series of County Avifaunas already published, Essex being one of the very few important English Counties whose birds have not yet been specially described.

Post 8vo., pp. lviii. and 588, with Three Maps. Price 14s.

A FLORA OF HERTFORDSHIRE.

BY THE LATE
ALFRED REGINALD PRYOR, B.A., F.L.S.,
Vice-Pres. Herts. Nat. Hist. Soc.
EDITED FOR THE
HERTFORDSHIRE NATURAL HISTORY SOCIETY.
BY
BENJAMIN DAYDON JACKSON, SEC. L.S.,
Hon. Memb. Herts. Nat. Hist. Soc.
WITH AN INTRODUCTION ON THE
GEOLOGY, CLIMATE, BOTANICAL HISTORY, ETC., OF THE COUNTY.
BY JOHN HOPKINSON, F.L.S., F.G.S.,
Vice-Pres. Herts. Nat. Hist. Soc.
AND THE EDITOR.

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A VISIT TO AN ESSEX GULLERY, WITH NOTES ON THE BIRDS FREQUENTING THE MARSHES ROUND TOLLESBURY.

By EDWARD A. FITCH, F.L.S., F.E.S. (President of the Essex Field Club),
and MILLER CHRISTY.

On Tuesday, June 12th, 1888, we enjoyed in company a most interesting day among the birds frequenting the Old Hall Marshes, Tollesbury, which are chiefly in the occupation of Mr. Joseph Smith, jun., of Pattiswick Hall. Our main object in visiting these marshes was to see the breeding-haunts of the Black-headed Gull (*Larus ridibundus*). This bird still appears annually, though in limited numbers when compared with the thousands frequenting many of the gulleries in the more northern counties. There are now but few gulleries in England south of Essex, and none of large size. In accomplishing our main object, we were completely successful, thanks to the kind attentions of Messrs. Jonathan May and George Wilsher, Dr. Salter's gamekeepers, and Fred Clarke, Mr. Smith's marshman; while we also came unexpectedly across several other breeding birds of considerable interest. The following paragraphs give a brief account of our observations and proceedings.

Our head-quarters for the day, by the kind permission of Mr. Smith, were at Bourchier's Hall, an ancient farm-house, possessing a very extensive view over the marshes and saltings towards Mersea. It is obviously a fragment only of a once-fine mansion, as one of the rooms has much good panelling and contains an exceedingly good, elaborately-carved, oak fire-place and mantel-shelf. This is of large size, extending quite to the ceiling, and is decorated with the fully emblazoned arms of the Gardiner and other families.

Leaving Bourchier's Hall, a walk of about three-quarters of a mile brought us to "The Hoy," a small public-house which stands on the edge of the marshes. A "hoy" was a one-masted, sloop-rigged, coasting vessel, formerly much used, but now almost forgotten. There is only one other inn of the same name in Essex, namely at South Benfleet, where there is a double pictorial sign. Here there was no sign, not even the name being visible.

After passing the "Hoy," we found ourselves at once on the marshes. The first bird of any interest seen was a redshank, locally known as a "teuke." There seemed to be a fair number of these about, but still they were not numerous. The keepers, however, said they bred there, as they do more or less abundantly on most of the flatter parts of the Essex coast; and soon afterwards we came across a nest containing two perfectly fresh eggs—the beginning, no doubt, of a second brood. It was in a dry open spot, though near a ditch, and was so well concealed among the short grass, which closed over it, that we should never have found it had not the old bird flown off. Within a couple of yards was a skylark's nest with three eggs.

Proceeding further, we shortly reached the edge of a large marshy pool with reedy banks, known as the Joyce's Head Fleet. Upon this we embarked in a boat with the keepers. At one end of the pool was a large assembly of coots, numbering considerably over 100, and among the reeds we saw several of their nests containing eggs. As we advanced we approached one of the smaller nesting-colonies of the black-headed gulls, which was upon a small boggy island, some five or six yards across, and thickly over-grown with rank nightshade. Here were about a dozen gulls' nests—substantial structures, built of reed-stems outside and lined with small tufts of grass. None were placed actually upon the ground, but all were resting on the nightshade and reeds. Several of the nests were empty, but others contained one egg each and one held two. They were only slightly incubated. While we were at them, the old birds—locally known as "cobs"—were very noisy overhead.

Upon the same island, the keepers showed us the nest of a "dunbird" (that is, a pochard), well hidden among the reeds and nightshade. The young birds had left it a week or two, but the fragments of egg-shells and the down, still remaining in the nest, clearly showed to what bird it had belonged. The eggs of this species are of a pale greenish-buff, and the down is of a greyish-black, with obscure white centres. It is readily distinguished from that of any other species, except the tufted duck, than which it is slightly browner. We are not aware that the pochard has been before recorded as breeding on the Essex coast (at least, of late years), and the following facts, told to us by the keepers, are, therefore, of considerable interest. Two years ago, that is in 1886, a single pair remained during summer and bred on the marshes. The keepers were of opinion that one or other of this pair had been wounded, and had thus been prevented from migrating with its fellows. However this may have been, last year five or six pairs—no doubt the offspring of the original pair—bred on the same marshes; while this year (1888), the number has increased to seventeen or eighteen pairs at least. It is probable, too, that the species is increasing in the neighbourhood, for in the spring of last year Mr. Fitch found a nest on his land on Northey Island. This nest was at the time recorded as that of a wild duck (ESSEX NATURALIST, i., 150), but is now certainly identified as that of the pochard, from the colour of the eggs and down it contained. This year another similar nest with eleven eggs, was mown over in a field of red clover on Northey; the eggs were put under a sitting tame duck as soon as possible, and Mr. Fitch hopes to hatch them out. The Rev. J. C. Atkinson, now of Danby, Yorkshire, who knew this district very familiarly in his early days, his father having been curate of Peldon, says in his "British Birds' Eggs and Nests" (p. 174):—"The Dunbird does not now breed in this country." During the day, we several times saw adult pochards about, either singly or in pairs, while some of the females had evidently young broods among the reeds. The keepers were naturally very chary of disturbing a sitting bird, but they kindly took us to another nest from which the young had only been hatched-out a day or two. It was built, like the other, among the reeds on the edge of a pool. This nest Mr. Fitch removed intact for presentation to the museum of the Essex Field Club.

Wild ducks, also, were by no means scarce, and were evidently breeding, or had bred, close at hand, their young doubtless being concealed among the reeds, though we did not actually see any nests. We also, on one occasion, observed a pair of shovellers flying over, which we understood had bred in a tussock on the marsh near at hand. We were also told of a pair of breeding sheldrakes, but did not actually see them. These birds, though now rare on the Essex coast, seem once to have been abundant. Albin says that in his time (1731), they were "found about several lakes and rivers near the sea-coast of England and Wales, but chiefly in Lancashire and Essex."

Proceeding further on to the Marsh, we visited a second and larger colony of gulls, which were nesting in some reed-clumps about ten yards from the edge of another pool, known as Pennyhole Bottom. Here were about twenty-five nests, most of them containing either one or two eggs, though several held none, and one, three. We reached them by wading, the water not being over eighteen inches deep. They did not differ in any essential respect from those already described, and the old birds, as before, were very noisy over our heads while we remained at them. The eggs are decidedly variable, the ground-colour ranging from greenish-olive to dark russet-brown. We brought away several of the more curiously-marked specimens.

Close at hand was another large pool, known as Pennyhole Fleet, among the reeds on the edge of which, the keepers told us, about sixty pairs of gulls had built their nests earlier in the year, but that the birds had suddenly and unaccountably deserted them before laying any eggs.

There can be no doubt that there were once many more nesting-colonies of the black-headed gull on the Essex coast than there are now. The names Great Cob Island and Little Cob Island in Tollesbury Fleet, and Cobmarsh Island at the entrance to Mersea Quarters, are evidences of the ancient tenure of the gulls in this locality. There is also a Cobb's Farm on the Goldhanger coast.

Mr. C. Parsons, writing from Southchurch in 1833 says ("Field Naturalist's Magazine," i., 533):—"The black-headed gull is a constant resident with us, but not until last summer have I ever been able to discover a nest in my immediate neighbourhood, although on a small island about twelve miles further on the coast they regularly breed in abundance. I was much pleased last spring on finding a few eggs on a piece of salterns a short distance from where I reside, and on visiting the spot about a week after I found that a large company of them had taken up their abode there." He adds that some fishermen took many of the eggs, and although the birds were indefatigable in laying, not an egg was allowed to hatch.

A much older allusion to an Essex Gullery is that of Fuller. In his "Worthies of England," published in 1662, he speaks of the island, still known as Pewit Island, but formerly as Fowley Island[1]; it is for the most part in the parish of Great Oakley (not Little Oakley as Morant says), between Walton-on-the-Naze and Harwich. The black-headed gull is still sometimes called the pewit gull.[2]

Morant (i., 490), in alluding to Fuller's statements, cautiously remarks that the island takes its name from the "great quantities of pewits which come and breed in it in the spring, but whether all the wonderful circumstances related by Dr. T. Fuller are exactly true is doubtful, as [for instance] that they come on St. George's day precisely, that they seldom sleep whilst they sit on their eggs, etc."

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[1] The passage from Fuller's "Worthies" here referred to is set out in Mr. Harting's paper on Decoys, *ante* page 159.—Ed.

[2] In Dale's "History of Harwich" (page 402), it is called "The Pewit or Blackcap." There is another Pewit Island between Mersey Creek and Parrock, and a third near Bradwell waterside on the Blackwater, from which basketsful of gulls' eggs used to be obtained within the memory of persons now living.

From a contribution by Mr. J. H. H. Knights, of Ipswich, to the "Field," in February, 1884, it appears that a few gulls still breed on, and in the neighbourhood of, this Oakley Pewit Island. Probably the bird still breeds, though in very limited numbers, on several parts of the Essex coast, although Mr. Howard Saunders in his edition of Yarrell's "British Birds," stated only a year ago (vol. iii., 595) that he then knew of no breeding place of this bird in Essex.

Whilst wading about at the Gullery, we came upon the nest of a dabchick, containing four partly incubated eggs, very much discoloured, sopping wet, and covered with dripping water-weeds. The keepers, who said they were fairly common in the Fleets, had some more eggs, one of which, being freshly-laid, was almost white.

One of the keepers also had three wheatear's eggs, taken a few days before from a hole in one of the sea-walls.

The only other interesting birds we noted were a few pairs of Yellow Wagtails (*Motacilla raii*), which breed not uncommonly in the broken ground on the edges of the marsh ditches ; also a flock of about twenty large gulls, probably Lesser Black-backed Gulls. The keepers, who said that they had been blown there by the strong south-easterly breeze, and that they would not remain, called them "Great Cobs." It is hard to say whence they could have come at this time of year, as there is no recorded breeding-place on the east coast south of Northumberland.

From one of the keepers we heard of a large "Foreign Hawk," which he had seen about the marshes for several days, flying low over the fleets, about three weeks before the date of our visit. As he said it had grey or white over the tail, it was probably a marsh harrier. He was unable to approach it sufficiently near to shoot it. Its being here at this time of the year suggests breeding.

During the day we visited two ancient Decoy Ponds on these marshes—one a small square pond, still known as the "Teal Pond," but now a long time disused ; the other a much larger pond, with its pipes still almost perfect, and in working order, though now but rarely used. There are now but half a dozen pipes, instead of seven as formerly, the two south-easterly ones having been disused and a new one dug in place ot them. Both these decoys are described by Sir Ralph Payne Gallwey in his "Book of Duck Decoys."

Mention of the Teal Pond reminds us that Mr. J. May, who has known these Old Hall Marshes for upwards of forty years, told us that in his young days he remembers seeing as many as thirty pairs of teal breeding, but they have for some time been gradually becoming scarcer. Last year he knew of two nests, but this year he feels certain there is not one on the 1,700 acres, or thereabouts, now under his supervision.[3]

During our walk over these marshes we visited two "Red Hills," one in the Ten Acres and one in the Cowhouse Marsh; these had been almost entirely carted away for manure, as is so commonly the case. We saw two much larger ones on Mr. Kingsley's Brook Hall Marsh, Salcott, but could not quite get to them.

Ice Crystals during Fog.—In the hope that this phenomenon may be more profitably observed during the winter, I venture to send an account of the very beautiful display I witnessed in the Thames valley at Clewer, in December, 1882. If the occurrence is rare, it may, perhaps, be worth inserting in our journal. On the 1st of December the weather was very cold and foggy, after snow. On the morning of the 2nd, I noticed that the points, edges, and projecting parts of all objects out of doors, from the low shrubs to the highest tree-tops, were bristling with clustering spicules of clear ice, shining in the few fleeting gleams of sunlight with brilliant coruscations, forming a fairy-like scene not easily forgotten. There was a general but not very dense fog at the time, drifting almost imperceptibly from the south or south-west, whilst the air temperature was about freezing point. Innumerable spikelets of clear ice pointing in all possible directions and of all sizes up to an inch and a quarter in length, as measured by me, and doubtless longer, grew in nucleated clusters, or continuous lines of clusters from the projecting points and edges of every object exposed to the open air. Even the spider lines were encrusted with spiky crystals, and hung in festoons of glasswork cords; and it was surprising what a weight of ice they bore. Every leaf and twig was edged with a spreading fringe of sparkling spikelets, and so were the corners of every post and pale, and every wall and building. The more delicate trees, the birch and elm, were a marvel of intricate crystal tracery, and for quasi-symmetrical ornamentation the araucaria was conspicuous, while the scene amongst the trees of Windsor park and forest may be better imagined than described. The phenomenon lasted all that day and night, and part of the next day; but towards noon of the 3rd, a thaw with wind set in, which brought down the ice crystals in showers of spikes, which lay in masses under each tree till melted. There was no appearance of hoar frost, no opaque white rime to be seen anywhere from first to last, nor did I notice that the grass of the lawn was crystallized like the leaves and twigs as above described. On enquiry I found a few persons who had witnessed a similar sight before, though rarely, and my brother, the late Col. Russell, only remembered seeing it once in his life, some 25 or 30 years previously, I think he said, and then under very similar circumstances, namely, during a very slowly drifting fog in frosty weather. Perhaps some of our members can offer a more scientific explanation than I can of the beautiful phenomenon I have ventured to describe.—[Colonel] BRYDGES R. BRANFILL, Billericay, November, 1888.

Otter at Earls Colne.—A fine female Otter, weighing 16½ lbs., was shot on Saturday week [September 22nd] by Mr. Frank Hunt, in the river Colne, near Burrell's Bridge.—"Essex County Chronicle," October 5th, 1888.

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[3] The same thing has happened on Northey Island; no teal have nested there for the last three years.

THE GREAT FLOOD IN ESSEX OF AUGUST 1st and 2nd, 1888.

By D. RADFORD SHARPE, F.R. Met. Soc.

It has been thought it would be very proper that this Journal should contain some record of the disastrous flood which took place in Essex at the beginning of last August. The local newspapers at the time of the flood were very full of narratives of the great damage done to property, the hair-breadth escapes, and the plucky rescues which took place, so that all who reside in the county cannot fail to have been well informed on what may be called the more popular aspects of the event, but no account has been given treating of it from the meteorological point of view. I have, therefore, at the request of the Editor, done my best to get together from the rain-fall observers in Essex, records of the amount of rain which they collected, and other notes of the occurrence. These I have endeavoured to discuss, and I have prefaced them with a few general remarks.

Roughly speaking, this flood visited the south-west of Essex, which seems to be that part of the county most subject to such troubles. I have not been able to ascertain much with respect to former floods in this district, but I am indebted to Mr. Henry Corder, and to that gentleman's father, Mr. H. S. Corder, of Great Barrow, for the following particulars. It seems that in June, 1824, there was a very disastrous flood at Chelmsford, before which the rain had been falling for two days and nights. Mr. H. S. Corder distinctly remembers the hay being left high up in the trees overhanging the Wid, showing a rise of at least 10 feet. It was also said at the time that the water rose to the ceiling of the old Grey Friar's house at Moulsham (now removed), which may be 10 or 12 feet from the usual river level. Further, it appears that the water reached as far as where the London and County Bank now is in High Street, Chelmsford.[1]

Mr. Chancellor, of Chelmsford, considers that the 1824 flood was 15 in. higher than that of 1888. Mr. Henry Corder also tells me that on October 9th and 10th, 1880, there was a great flood on the Wid, and the smaller streams between Ingatestone and Maldon. During this flood the water flowed into Chelmsford High Street, through the "Queen's Head" yard. Then again there was a serious flood at Chelmsford, on December 20th, 1881, when it is said that the Chelmer was higher than had been known for twenty-two years at Broomfield Mill; the flood-water was also deep on the Baddow Road. Mr. Corder says that the rain then did not affect the Wid, as it chiefly fell in North Essex.

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[1] A fact which may be recorded as connected with this flood, was that while removing a large heap of shingle near Moulsham Mill, the workmen found a very perfect British Gold Coin of Tasciovanus. This coin is now in the possession of Mr. H. S. Corder.

From the "Essex Times" I learn that at Romford there was a serious flood in 1841, but on that occasion the water mark is said to have been from 12 to 15 inches below that of the late flood.

I have said that this flood of August, 1888, visited the south-west of Essex, and in fact the district visited may be contained very nearly within lines drawn from Witham, on the north-east, to Loughton, on the north-west, from that place to south-west Ham, from south-west Ham to Tilbury, and from Tilbury back to Witham. The places which suffered most appear to have been :—Chelmsford, Romford, Ilford, Woodford, South-West Ham, and Barking. At Chelmsford the High Street and other streets were flooded, the iron bridge over the Cann was swept away, and some boundary walls were washed down. At Romford great damage was done, the High Street being flooded, as well as other streets. The brewery of Messrs. Ind, Coope and Co. received great damage, and much property was carried away. The low lying marshes at Ilford were flooded, the Great Eastern Railway between Ilford and Chadwell Heath stations was submerged in some places to a depth of 6 or 7 feet, and the traffic stopped. At Woodford, water rose to a considerable height in many of the cottages near the river, the flood also stood at a depth of more than 4 feet in parts of the Lower Road leading through Woodford Bridge to Chigwell. At South-West Ham much damage was done and distress brought about among many of the inhabitants by the amount of water, and the time during which it remained. On August 8th, the flood had not receded from parts of this district. Between Barking and Plaistow, on the London and Tilbury Railway, the ballast under the permanent way was washed away, and a gap caused in the line. I may further mention that at Brentwood the railway, which lies in a cutting, was flooded, the water standing at a level of several inches above the floors of the waiting rooms and offices of the station.

It is, therefore, not unnatural that we should expect to find heavy rain-falls in the neighbourhood of these places, in that part of the country in fact which is watered by the Wid, the Ingreburn, the Bourne, and what I may call the lower Roding.

Having pointed out these features of the flood, I turn to the more special objects of these notes and draw attention to Table A, printed herewith. This table shows the total rainfall for the month of July, 1888 (the month immediately preceding the flood) as reported from thirty-five places of observation in the county of Essex. The first column gives the total amounts, in inches, of rain collected by the help of the rain-gauge at these places, the second the greatest fall in twenty-four hours during the month, the third shows the date of that greatest fall, and the fourth column shows the number of

TABLE A.—RAINFALL TABLE FOR THE COUNTY OF ESSEX, JULY, 1888.

STATION.	Total for Month.	Greatest Fall in 24 hours.	Date of same.	Number of Wet Days,
Shoeburyness	3·95	0·85	6th	14
Southend	4.83	1·40	6th	19
North Ockendon	5·69	1·10	17th	19
Little Ilford	6·19	1·92	31st	22
Ilford	5·41	1·35	30th	22
Woodford (The "Harts") ...	5·32	0·78	5th	21
Do (Haggar Lane) ...	4·48	0·50	15th	19
Epping	6·28	1·08	18th	20
High Roding	4·50	1·23	30th	23
Sheering	3·61	0·51	30th	23
Brentwood ("Sawyer's Hall") ...	4·26	1·50	30th	15
Do. ("Dudbrook House")	5·35	1·70	30th	16
Billericay	3·84	1·34	30th	19
Ingatestone	4·94	1·79	30th	20
Broomfield...	3·98	—	—	—
Roxwell	4·33	1·33	30th	17
Writtle	3·91	1·06	30th	19
Chelmsford	3·41	1·45	30th	19
Great Baddow	4·12	1·27	30th	12
Saling	4·20	1·24	31st	20
Braintree ("Bocking Place") ...	4·61	0·98	31st	19
Do (London Road) ...	4·93	0·91	31st	22
Rivenhall	5·01	—	—	—
Little Braxted	4·25	1·18	30th	21
Cold Norton	3·86	0·65	30th	19
Bradwell-on-Sea("Bradwell Hall")	4·27	0·49	6th	19
Do. ("Down Hall")	4·09	0·52	6th	17
Earls Colne	4·40	0·58	30th	19
Colchester...	3·79	0·45	6th	21
Do. ("Surrey Villa") ...	4.72	0·48	28th	20
Great Bentley	3·95	0·53	11th	19
Dedham	4·01	0·52	10th	21
Lawford	4·20	0·60	5th	21
Newport	3·80	0·62	6th	24
Saffron Walden	3·69	0·54	27th	23
Average for the County ...	4·46			

"wet" days, or days on which 0·01 in. of rain, or above, was registered. Now it will be seen that the average rainfall of these 35 stations is 4·46 in. for the month, which I call the average for the county. From tables in my possession I am able to state what were the averages for July for the county for the years 1882 to 1886. They are as follows:—

1882	2·45 in.
1883	2·45 in.
1884	1·96 in.
1885	0·73 in.
1886	2·61 in.
Mean average for the five years	2·04 in.

So that the average for the county for July, 1888, is more than double the average for the five years 1882 to 1886. Truly July, 1888, was a very wet month. Of these thirty-five places or stations, seven, viz., North Ockendon, Little Ilford, Ilford, Woodford, ("The Harts,") Epping, Brentwood, ("Dudbrook House,") and Rivenhall, show total falls of over 5 inches. All of these, with the exception of Rivenhall, are within the district which I have pointed out was most affected by the flood, and Rivenhall is just on the border of that district.

It will be seen, therefore, that at the end of July, the land must have been very much saturated with moisture, the rivers full, and everything ready for a bad flood, should the "last straw" come. This "last straw" did come, as we all know, in the shape of the rain which fell during the greater part of August 1st.

Let me now, therefore, call attention to Table B, which gives the rainfall from July 26th to August 1st, the seven days which preceded the flood, as recorded at thirty-four out of the thirty-five Essex "stations" (I have no return from Earl's Colne), and of these, sixteen "stations,"—viz., Southend, North Ockendon, Little Ilford, Ilford, Epping, Brentwood (Sawyer's Hall), Brentwood ("Dudbrook House") Billericay, Ingatestone, Broomfield, Roxwell, Writtle, Chelmsford, Great Baddow, Rivenhall, and Little Braxted, recorded a rainfall of over 4 in. North Ockendon, the two Brentwood stations, Billericay, Ingatestone, and Great Baddow, showing over 5 in. Woodford ("The Harts,") and Woodford (Haggar Lane) are the only two places in the flood-district, which I have mentioned, where the total fall for this week is not over 4 in.

TABLE B.—DAILY RAINFALL (IN INCHES) FOR THE SEVEN DAYS PRECEDING THE FLOOD.

1888.	Shoeburyness.	Southend.	North Ockendon.	Little Ilford.	Ilford.	Woodford (the Harts).	do. (Haggar Lane).	Epping.	High Roding.	Sheering.	Brentwood (Sawyer's Hall).	Brentwood (Dudbrook House).	Billericay.	Ingatestone.	Broomfield.	Roxwell.	Writtle.	Chelmsford.	Great Baddow.	Saling.	Braintree (Bocking Place.	Braintree (London Road).	Rivenhall.	Little Braxted	Cold Norton.	Bradwell-on-Sea (Bradwell Hall).	Bradwell-on-Sea (Down Hall).	Earls Colne.	Colchester.	Colchester (Surrey Villa).	Great Bentley.	Dedham.	Lawford.	Newport.	Saffron Walden.
JULY 26	—	—	·04	·05	·08	·11	·09	·20	·03	·03	·37	·12	·01	·11	·03	.10	·02	·04	—	·04	·16	·02	2·12	·01	—	—	—	—	·16	·22	·07	—	·10	·03	·17
,, 27	·45	·32	·60	·33	·39	·39	·32	·30	·43	·35	·44	·50	·49	·38	·42	·39	·42	·42	·54	—	·02	·49		·47	·43	·45	·47	—	·02	·27	—	·49	·48	·45	·54
,, 28	·06	·27	·09	·04	·06	·07	·06	·45	·04	·11	·07	—	·01	·09	·27	—	·12	·11	·19	·25	·51	·06		·11	·02	·12	·12	—	·43	·48	·47	·23	·06	·02	·02
,, 29	·12	·11	·12	·18	·19	·11	·12	·27	·25	·26	·05	·20	·15	·28	1·26	·19	·17	·08	—	—	·03	·43		·18	·14	·20	·15	—	·03	·22	·08	·14	·14	·26	·21
,, 30	·13	·30	1·01	1·92	1·35	·27	·41	·63	1·23	·51	1·50	1·70	1·34	1·79		1·33	1·06	1·45	1·27	1·24	·35	·91		1·18	·65	·41	·38	—	·15	·17	—	·29	·39	·10	·09
,, 31	·55	·41	·26	·30	·24	28	·17	·15	·18	·14	·50	·21	·32	·27	·24	·20	·24	·27	·29	·20	·98	·21		·26	·28	·22	·18	—	·28	·35	·39	·06	·02	·06	—
AUG. 1	1·96	2·83	4·56	1·80	2·16	2·10	2·16	2·43	1·32	1·99	3·00	2·72	3·37	3·20	1·88	2·02	2·07	2·21	2·80	1·13	1·20	·89	1·98	2 08	1 88	·68	·78	—	·08	·11	·06	·6c	1·22	·57	·04
	3·27	4·24	6·68	4·62	4·47	3·33	3·33	4·43	3·48	3·39	5·93	5·45	5·69	6·12	4·10	4·23	4·10	4·58	5·09	2·86	3·25	3·01	4·10	4·29	3 40	2·08	2 08	—	1·15	1·82	1·07	1 81	2·41	1·49	1·07

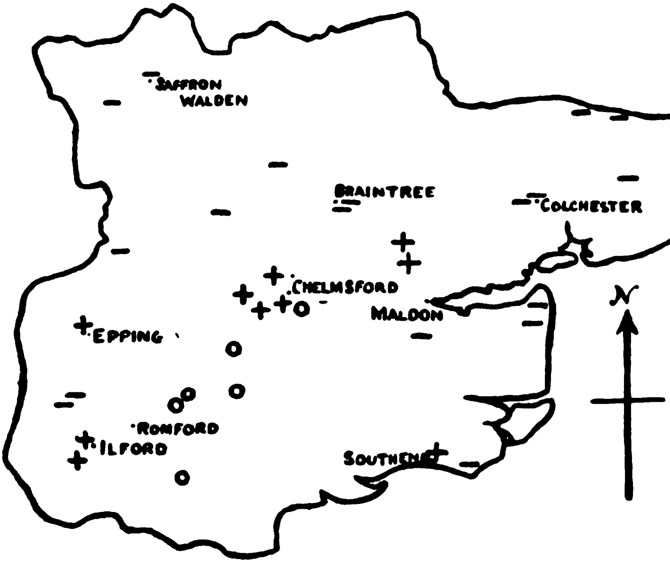
Now let us observe the rainfall of August 1st. Fifteen "stations" give a fall of over 2 in.:—viz., Southend, North Ockendon, Ilford, Woodford ("The Harts") Woodford (Haggar Lane), Epping, Brentwood ("Sawyer's Hall"), Brentwood ("Dudbrook House"), Billericay, Ingatestone, Roxwell, Writtle, Chelmsford, Great Baddow, and Little Braxted. North Ockendon heads the list with 4·56 in., Billericay shows 3·37 in., Ingatestone 3·20 in., and Brentwood ("Sawyer's Hall") 3·00.

From data I have of rainfall in Essex (July 1882 to December, 1886), I can find nothing to compare with these figures. The nearest amounts to them are on September 10th, 1885, when Dedham registered 2·20 in., Little Braxted 1·96 in., Braintree ("Bocking Place"), 1·85. Braintree ("Fennes") 1·80, and Earl's Colne 1·70 in. I further find that on September 3rd, 1884, at Southend, 1·85 in. was registered in the twenty-four hours, and at Bradwell-on-Sea on the same date, 1·88 in. Mr. Holthouse, of Southend, tells me that on July 13th, 1880, he registered 2·15 in. between 3 p.m. and 5·45 p.m., which is certainly a very remarkable record, and I wish I had data respecting it from other parts of Essex. It may, therefore, well be said that the rainfall of August 1st was a very heavy one for Essex, and coming, as I have shown, at a time when the land was well saturated with moisture, on account of a succession of wet days preceding it, it is not surprising that such a flood was occasioned.

I have shown that the heaviest rainfalls just before this flood were in that district which suffered most. I do not mean to say that there must be such falls in that district to cause such a flood, for it is quite possible that if the heaviest rains had fallen in the district watered by the upper parts of the Chelmer, Cann, and Roding, similar disasters would have been brought about at Chelmsford, Romford, Ilford, and other places in the south-west of the county.

I give herewith a small outline map of the county of Essex, which will, perhaps, more graphically present the details of Table B. The amount of rain collected at the various "stations" during the week preceding the flood, is shown on the map as follows:—Where under 4 in. fell, I have placed a —, where over 4 in. fell a +, and where over 5 in. fell a O.

In conclusion I wish to thank all those rainfall observers in Essex who have so kindly responded to my request to be furnished with particulars of rainfall, and notes respecting the flood. I have not been able to embody in this paper all the notes sent me, for fear I should occupy too much space, but none the less have I been able to gather valuable information from much that I have not actually quoted, and to form therefrom a more correct general idea. I have also made use of the accounts published in the "Essex County Chronicle," the "Essex Weekly News," the Essex Times," and the "Woodford Times," and I am, therefore, indebted to the conductors of those papers.



Sketch outline map of Essex to illustrate the details of Table B. The sign — denotes under 4 in. of rain; + over 4 inches; o over 5 inches.

Wren's Nest in a Dead Crow.—"Some three years ago a carrion crow was shot and hung up as a warning by a keeper at Lexden. By a bit of wire it hung and swung in the wind undisturbed till last spring, when a pair of wrens, probably of a facetious turn of mind, built their nidus, or eligible freehold residence, within its hollow carcase, making substantial walls and foundation for their home of well-seasoned oak leaves. I will not say the walls were as thick as those of some houses in Colchester, for that might draw me into a libel action, like the famous one tried at Chelmsford a year or two back, but they were certainly an inch-and-a-half thick. Mr. and Mrs. Wren spent a happy summer in this retreat, and Jenny laid her eggs there and reared her young. The couple then left this country residence, and it was discovered by a gamekeeper, or some other 'two-legged bird,' as the saying is, and the mansion was sold by private contract to Mr. G. French, of the Railway Tavern, who, I believe, has it now on view."—From the "Essex Standard."

The Tinamu in Essex.—Referring to Mr. Harting's paper "On the introduction of a new game-bird (the *Tinamu*) into Essex, etc." (ESSEX NATURALIST, vol. ii., pp. 102—111), Mr. John Bateman, J.P., of "The Hall," Brightlingsea (the introducer of the bird into this country), writes as follows in a letter to the Editor:—"The ESSEX NATURALIST reached me during harvest, and until that was over I could not tell how many nests had batched off, or how the experiment stood for 1888. I now send the 'latest intelligence.' In last April, nine healthy Tinamus were turned out of the aviary to join a possible two or three survivors of the Tinamus of 1885-6, still at large in the neighbourhood. Their flute-like call was soon heard in the meadows and rye grass, and all promised well; about June 15th the weather broke for good, and the diary of our observations is as follows:—

June 25th.—One nest completely destroyed in rye-grass by machine—it contained four eggs—unsat.

June 26th.—One nest in marsh-meadow, six eggs—unsat.

August 20th.—A nest with four eggs on a grazing marsh was hatched off (this was probably a second effort on the part of one of the pairs, whose nests came to grief June 25th or 26th).

September 8th.—Nest found in barley, eight eggs, six of which were hatched off, and two were bad.

September 8th.—Nest found just at the point of hatching eight eggs—these were hatched out in an incubator, but the young all died the first sharp frost. (N.B.—Second broods of partridges as late as this invariably perish.)

September 9th.—One young bird, size of a landrail, killed accidentally by reaper.

September 10th.—Two nests, each containing three eggs, found in badly 'laid' barley, *i.e.*, the parent birds had lost sight and cognizance of their nests. Eggs stale and completely spoilt.

September 16th.—One full grown tinamu shot by accident. One guinea fine imposed on the slayer.

October 21st.—Four healthy tinamus arrive from Mr. Shennan's estancia of 'Negrete' on the River Plate. These will be enlarged in April, 1889. Twelve started on the voyage, but eight died.

It follows that the maximum increase to the Tinamu population of Essex (unless some nests were hatched off undiscovered) is:—$4+6-1-1=8$.—JOHN BATEMAN, Brightlingsea, October 28th, 1888."

Badger Killed by a Train at Theydon Bois.—In the "Essex County Chronicle" for November 9th, Mr. E. Wederell of Theydon Hall, Theydon Bois, recorded the fact that a badger had been found dead on the Great Eastern line near Theydon, having apparently been killed by a passing train. Thinking that this might be one of the animals turned out in the forest some time ago, we made enquiries of Major McKenzie, the Superintendent of the Forest, and he has very courteously forwarded us a copy of a report made to him by Mr. G. Foster, the Head Forest Keeper. Mr. Foster reports:—"On November 5th, a Badger (dog) was found dead alongside the line of rails between Chigwell Lane and Theydon Bois Railway Stations, and close to a wood called 'Loughton Shores,' belonging to the Rev. J. W. Maitland. The badger was found by Harry Parish, of Theydon Green, a plate-layer in the service of the G. E. R. Company, when he was inspecting the line of rails early on the morning of the above date. The animal was sold to James Parish of the same place, who has had it stuffed. The weight of the badger was 42 lbs. (?) and its age doubtful, as it appeared to be an old one." Major McKenzie has no doubt but that the animal is one of those turned out by Mr. Buxton. He adds, "there are a good many young badgers in the forest, but we seldom see them." Mr. Wederell also writes that the badger "had no doubt been an inhabitant of Epping Forest, and had taken shelter in the wood adjoining the spot where it was killed. I have made enquiries, and the majority of people seem to be of the same opinion. Some say that a family of badgers are in the wood, which is certainly very thickly wooded." It is stated that the badger will be on view at the "Bull Inn," Theydon Bois, in the course of a month or so.—ED.

THE ESSEX FIELD CLUB.

FIELD MEETING AT "THE GRANGE," BISHOP'S STORTFORD, AND IN THE RIVER STORT DISTRICT.

Wednesday, July 18th, 1888.

AN excursion to the rivers Lea and Stort had long been suggested as a very suitable plan for a Field Meeting, and on receipt of Mr. and Mrs. Mann's very hospitable invitation to the Club to visit them at "The Grange," to see the hawks, and hear about falconry and falconers, it was resolved to combine the two visits in one day's meeting. It was soon found, however, that time would forbid the projected journey by water up the two rivers, and it was therefore arranged that the Lea should be reserved for the scene of a future excursion, and that the journey by barge should be down the Stort, from Bishop's Stortford to Harlow.

The "directorship" of the meeting was undertaken by Mr. T. J. Mann, Mr. Edward Taylor, F.L.S., and Mr. W. Cole, while Prof. Boulger acted as Botanical Referee, and Mr. T. V. Holmes was the authority on the very meagre features of geological interest in the district.

A large number of members journeyed down to Bishop's Stortford by the 8.45 a.m. train from Liverpool Street Station, and others joined at the stations *en route*, or, like our President (who slipped away from his mayorial duties at Maldon to attend the meeting), travelled from various parts of Essex and met us at Stortford.

On the way, Mr. T. V. Holmes was able to point out some of the more salient geological features of the landscape as seen from the carriage-windows, and he has favoured us with the following notes:—

"From Liverpool Street to the spot between Clapton and Tottenham, at which the railway crosses the alluvium of the Lea, the houses are too thick to allow the natural shape of the ground to be seen; the strata over or through which the railway passes being gravelly. But from Tottenham to the junction of the Lea and Stort, the traveller sees east of him the alluvial flat of the Lea, from half-a mile to more than a mile in breadth, and beyond it higher ground composed of London Clay. The railway keeps pretty close to the western border of the Lea marshes, and to the eastern edge of the broad spread of old river gravel, a few feet above the level of the marshes, and almost as flat as they are. On this old river gravel are Tottenham, Edmonton, Ponder's End, Waltham Cross, Cheshunt and Broxbourne, those old and populous villages whose inhabitants witnessed the famous ride of John Gilpin. Thus immediately eastward are scarcely any houses whatever, the country consisting of rich green pastures; while westward, on the very slightly higher gravel plain, are many buildings both old and new. From the junction of the Stort and Lea to Bishop's Stortford, the scene is much changed. The breadth of flat pasture land is much diminished; there is scarcely any old river gravel, and the higher ground, which approaches the stream much more closely, is composed not of London Clay but of overlying beds of Glacial Driftage, consisting of sand and gravel, capped by Boulder Clay. The scenery is extremely pleasant, and a great improvement on that of the Lea below Broxbourne. And as the scenery of the Lea between Tottenham and Broxbourne is as uniform as the geology, so the views on the Stort resemble each other for the same reason, and possess the same general character alike at Sawbridgeworth, Roydon, or Harlow."

On arrival at Bishop's Storford we found that our host had provided full carriage accommodation for the transit of the large party to his house, and thus many for the first time caught a glimpse of this ancient and "fair market town," now principally known from its malting trade, the kilns with their hooded ventilators, and the sweet odour of the transformed grain, being evidences of the industry which could not fail to strike the visitors. At the "Grange" all were most kindly welcomed by Mr. and Mrs. Mann, and we were soon gathered together on the lawn, where many gained a first insight into the once princely sport of Falconry. Mr. Mann has established for himself a name among those who are striving to revive the art of the falconer, or rather to extend its practice, for hawking has never quite died out in Great Britain. We found the hawks each on its "block"—three falcons, two tiercels, and a goshawk—and in attendance was Mr. Alfred Frost, Mr. Mann's falconer, belonging to a family well-known to experts—while Mr. Mann, Captain Thompson, Mr. Harting, and several other good falconers, most readily gave explanations of the details of a "cult" so strange to many. On the nearest block sat "Vic," a four-year old "passage" peregrine taken in Holland; next to her was "Lady Salvin," a two-year peregrine caught in Wiltshire. Then came "Farthingale" a two-year passage peregrine from Holland, who, we were told, distinguished herself greatly at rook hawking last spring, being a grand flier and very fast. "Next to her [we quote from the "Field"[1]] sat 'Lundy,' a very well-shaped and nearly clean-moulted tiercel, one-year old, from the Isle of Lundy, a good partridge hawk and clever at snipe. As affording a good example of an 'intermewed' hawk (having got through a moult) he presented a curious contrast to an Irish tiercel, 'Shamrock,' sitting next to him, and which although exactly of the same age (one year), had not as yet a blue feather in his plumage. Lastly came 'Shadow of Death,' a four-year old female Irish goshawk, whose skill in taking rabbits has been often put to the test, and has caused much wonderment to inexperienced beholders." Wonderful tales were told us of the doings and characters of these fine birds, who together had killed 250 head of quarry (partridges, pheasants, snipe, woodcock, etc.) during the last hawking season. At block was also one of Captain Thompson's Indian hawks—the beautiful little "Shahin"; while "on fist" all had an opportunity of seeing his grand "Saker" (*Falco sacer*) which excited much admiration. The birds' comfortable "mews" were thrown open to inspection, and the mode of feeding the hawks and their treatment explained, and soon the erewhile mysterious terms of art, such as "jesses," "swivels," "leashes," "hoods," and "bells," became, by force of ocular demonstration, as familiar in our mouths as household words. A very pleasant time was spent in rambling about the grounds and through the extensive greenhouses, and in inspecting in the study and hall many pictures, engravings, and books, illustrating all phases of natural history sport—for our host we found, was as notable with the gun and angle as with the hood and leash. In the library was displayed the collection of Lepidoptera belonging to the late Mr. English, which has been purchased by Mr. Mann, and which contains many rare Essex specimens.

Then the party, now increased to 80 or 90, adjourned to the great barn, which had been fitted up as a meeting-room. It had originally been planned to hold the meeting on the lawn, beside the hawks, but fears as to the weather led Mr. Mann to suggest the barn as a safer place for the assembly. In the words of the "Daily News" reporter "the cool old-fashioned place might have accommodated an audience of two thousand, and as we gathered at the further end on the solid threshing-floor, we were able to speak and hear without at all disturbing the sleek draught horses stalled at the other extremity. The wide open barn doors faced by the audience were the frame to a lovely pastoral scene—green meadows sloping gently down to stately oaks, elms, and willows in the hollow; waving cornfields ascending beyond to the horizon; and over all a summer sky upon which an ominous thunder-cloud was intruding. The twitter of small birds mingled with the applause with which the speakers were received." Around the pillars of the barn had been hung several old engravings of hawking scenes, and modern paintings of favourite falcons from the skilful brush of Mr. George Lodge (who was present), as well as illustrative diagrams and specimens of falconer's furniture.

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[1] A short but interesting report of the day's doings was given in the "Field" for July 21st, 1888, under the title of "Falconry in Essex," and a very picturesquely written article, descriptive of the meet, will be found in the "Daily News" for August 25th, 1888.

At the commencement of the proceedings an Ordinary Meeting of the Club (the 92nd) was held, Mr. E. A Fitch, President, in the chair. Messrs. H. J. Coburn and James Rippin were elected members. After a few observations from the Chairman, he called upon Mr. Mann to give his promised address upon :—

MODERN FALCONRY.

[In order to avoid any obscurity in the address and discussion thereon, occasioned by the use of technical words, Mr. Mann had a paper printed containing a glossary of the principal terms of the falconer's art, a copy of which was given to each member of the party. This glossary, with a few additions, is printed at the end of the address. In his opening observations Mr. Mann gave a short sketch of Falconry as it was practised centuries ago, and alluded to the value then set on trained falcons, and the special enactments passed to prevent their destruction. He then continued as follows :—]

Even so late as 1697 the law protected hawks' eggs, and any person convicted of taking or destroying them was liable to "a year and a day's imprisonment, and to incur a fine at the King's pleasure, to be divided between the King and the owner of the soil." Now, alas, the fate of the hawk is to be nailed with its fellows to the keeper's pole as flying vermin; or, sadder still, to be consigned to the tender care of the local "naturalist," who literally stuffs as much tow into the poor bird's skin as it can hold, and then labels it a "Peregrine," which noble bird the "specimen" in its "preserved" stage no more resembles than it does a pouter pigeon.

The Enclosure Acts and the introduction of the breech-loader, combined with the insatiable greed of so-called "game preservers," have almost abolished the grand old sport; whenever a tame pheasant is missed from the coop a hawk is credited with the loss, and another excuse for killing off all hawks is claimed by the gamekeeper. I admit that a sparrow-hawk will sometimes take a few pheasants and partridges when they are young, but the number is trifling. Another matter for deep regret in connection with modern game-preserving is the war waged against owls. I have frequently done my best to prove to a keeper the nature of owls' food, by taking the castings from below their nests and soaking the masses in warm water; the bones are then easily separated from the felt or feathers, thus demonstrating that mice, young rats, and small birds, have been the sole food of the denounced owl. But I fear that even this ocular demonstration failed to convince "Velveteens" of his folly, and of the important part these birds of the night play in the preservation of the balance of nature.

Many owners and keepers look with fear to the result of a day's hawking over an estate, but I am glad to say that in *this* I have convinced some of their error. Close to where I now am is a large field in which Alfred Frost, my falconer, trains the hawks, and flies them for exercise five days out of six in the season; notwithstanding this, two or three coveys of partridges may be flushed there at times, and I may say that the hill is never without some birds. A keeper in a very fine partridge district in Norfolk asked me the first time I went out "If the hawks wi' n'out banish the birds, Sir?" My reply was "No." The following season he was the first to admit that he had more birds on the land flown over than on any other part of the manor. I need hardly add that I leave off partridge hawking as soon as the 1st of February arrives.

Before proceeding to consider the different "quarry" flown at by falconers, permit me to read you a few lines of introduction from an old work by one Nicholas Cox, printed in 1697, and entitled "The Gentleman's Recreation." He says:—

> "The element wherein the *Faulconer* useth to trade, is the *Air*; and though he dealeth sometimes in the *Water*, yet he prefers the Air before it, that yielding him most Recreation; for it is unable to stop the high soarings of his generous Faulcon: in it she flies to such a height, that, being lost to the sight of Mortals, she seems to converse with Heaven alone; and, like *Icarus*, endangers her Wings to be scorched by the Sunbeams; and yet is fearless, cutting the fluid Air with her nimble Pinions, making her High-way over the steepest Mountains, and deepest Rivers, and in her lofty career looks down with seeming contempt on the greatest Glories we most estimate; and yet, such is her Loyalty and Obedience to her Master, that a word from his mouth shall make her stoop and condescend."

The hawks mostly used by English falconers are the Peregrine, the Merlin, the Goshawk, and the Sparrow-hawk; these being distinguished by the terms "long-winged" and "short-winged." The Peregrine and Merlin belong to the long-winged division, having the second feather in the wing the longest or equal to the third, a tooth in the upper mandible, and with "irides" of a dark brown colour. In the short-winged birds, viz., the Goshawk and the Sparrow hawk, the fourth feather in the wing is the longest, the tooth in the upper mandible is wanting, whilst the colour of the irides is a light yellow.

There are two methods of obtaining hawks: firstly, to take them from the "Eyry," when they are called "Eyesses"; secondly, to catch them in their autumn migration from Holland, when they are termed "Passage Hawks." When taken in mature plumage they are known as "Haggards." The former should not be taken too soon, but allowed to remain as long as possible in the nest, or they are apt to prove of that class of birds called "screamers," so much disliked by all falconers. When first taken from the nest they should be fed thrice daily at fixed hours, and on a regulated quantity of food. This is a matter of the greatest importance, because if neglected what are known as "hunger traces" will appear across the feathers when the hawk is taken up. I had a falcon last year ("Lady Loch Vane") with these traces so strongly developed that most of her "train" feathers had to be "imped."[1] The young hawks should be placed in a large hamper fixed in a tree, the lid being let down so as to make a platform on which they may be fed. This is termed "being at hack," but I am told that there is no mention made of "hacking" by the old falconers. Before the young hawks can fly some heavy bells should be put on them, partly to prevent their going too far away, and partly to handicap them in their attempts to kill for themselves; as soon as this latter trait is noticed they must be "taken up."

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[1] I once picked up in Cambridgeshire the wing-feathers of a wood-pigeon, showing distinct "hunger traces." [This defect, or disease, is consequent upon some want of sufficient nutriment during the growth of the feathers. A similar defect is said to appear in the wool of ill-fed sheep.—Ed.]

"Passage Hawks" are taken in Holland during the migration which occurs in October, and are brought to England to be trained. Hawks of the year are caught as well as some old birds; the latter, having led a wild life for two or more seasons, require more patience and care in training than Eyesses, but the grand sport obtained with them, at rooks and grouse, fully repays the trouble taken in training them. I believe that they are used and much valued by the "Old Hawking Club," whose headquarters are in the New Forest.

The number of Professional Falconers may be counted upon one's fingers. The particulars as to these I have taken from Messrs. Salvin and Brodrick's book.[3] They say (page 4):—"Sir John Sebright tells us that all the Falconers he had met with, either in England or on the Continent, came from Valkenswaard, a village near to Bois le Duc in Holland: this village has been from time immemorial, and is even to this day, famous for its Falconers, but we cannot go so far as to pronounce its inhabitants the *only* European Falconers. About the close of the 18th Century, Lord Orford and Col. Thornton made a considerable effort to revive hawking in this country, for which end they introduced the 'Dutch School of Falconry' into England." This school chiefly differs from the Scotch form of the sport in using "Passage Hawks," whereas Scotch falconers employ "Eyesses." Of the Valkenswaard Falconers who from time to time came to England, John Bekkers and his sons Peter and John, and a family of the name of Dankers, were the most celebrated. John Pells was also an excellent falconer; he was born in Holland in 1778, and when a boy of eleven he went to help the falconers of the Landgrave of Hesse Cassel, who was then the greatest encourager of the sport upon the Continent. There were always some Gyr-falcons in this establishment, and it was there Pells learned how to train this noble bird. He came to England about 1800, and was in the service of Mr. John Hall, Col. Wilson, the Duke of Leeds, the Duke of St. Albans, and others. The most remarkable instance of a succession of falconers is in the family of the Flemings of Renfrewshire the taste for hawking having descended for several generations from father to son. I exhibit an engraving from a picture by How about 1811, representing Mr. Fleming on horseback, with his falconer the famous John Anderson, and George Harvey the "Cadger." John Anderson was born about 1749, in the Parish of Currie, a few miles west of Edinburgh, and died in 1833 at the advanced age of 84. In later days another well-known Scotch falconer passed away, viz., Peter Ballantyre, who died in November, 1884, aged 86 years. He trained a wonderful game falcon, "Pearl," and it is a curious fact that she died the same day as her master. Lord Eglinton had during his life many Scotch falconers wholly unconnected with the Dutch school. The well-known family of the Barrs are all dead. Of the family of the Rutherfords, of Lakenheath, two brothers are in the service of Major Fisher. The adjoining village of Hockwold has produced two well-known falconers, viz., John and Alfred Frost; the former is falconer to the "Old Hawking Club," and Alfred Frost is with me.

A falconer should be a good rider and a first-class walker, but above all he must be a *patient* man—bad tempered hawks are very trying, and unless a falconer is kind and gentle, and always in company with his birds, poor sport will be the result.

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[3] "Falconry in the British Isles." By Francis H. Salvin and William Brodrick (Lond., 1885.) Other works which will afford a large amount of information to those desirous of pursuing the subject, may be mentioned, *e.g.*, "Falconry—its Claims, History, and Practice," by Gage E. Freeman, M.A. ["Peregrine" of the "Field,"] and F. H. Salvin (Lond., 1859); "Practical Falconry," to which is added, "How I became a Falconer," by G. E. Freeman (1869); while in Mr. J. E. Harting's book—"Essays on Sport and Natural History" (Lond., 1883) will be found some capital papers on the "noble art."—ED.

Heron Hawking.—Of this sport I know nothing personally. It has long since been discontinued in this country; I believe that the last flights took place in Norfolk, about the year 1843, with falcons belonging to the late Mr. Clough Newcome, who then possessed two wonderful Heron-hawks—"De Ruynter," and "Sultan;" they each took fifty herons in one season. Prior to this the celebrated "Loo Hawking Club" flew at herons in Holland, and had grand sport at Valkenswaard, one of their meets being most graphically described in Messrs. Salvin and Freeman's interesting book, entitled "Falconry: its Claims, History, and Practice" (1859). A cast of falcons were always used in this sport, being unhooded when the heron was on passage from the feeding-ground to the heronry.

The same heron has sometimes been caught two or three times, and after the falconer had attached to its leg a copper ring, with date and name of the captor, it has been permitted to escape. Curiously enough, some years since, a heron was taken in Hockwold Fen, Norfolk, and on its leg was a ring with Mr. Clough Newcome's name, and place of capture—"Holland,"—thus showing the great distances these birds will travel.

Rook-Hawking.—This can only be carried out in very open country, such as Salisbury Plain, or the more open parts of Cambridgeshire. One falcon is usually employed in these flights, but now and then a "cast" is used, and the falconer is always mounted. The hawk is unhooded by the Master or Brother Falconer, walking by the side of the horse, and keeping out of sight of the wary rooks. At times a good slip can be obtained when the rooks are in passage to or from their feeding grounds, but it should be remembered that the quarry must always be "upwind." It is an astonishing sight to witness the manner in which the rook can ring into the sky, and unless the falcon begins at once taking wide and good rings, the rook escapes by simply outflying her; for it should be remembered that the hawk must always be above its quarry ere the fatal swoop can be made. The rook's usual mode of escape is to "put in" (*i.e.*, to fly head first into the nearest fence or bush), and should there be no one up to put the quarry out, the hawk is apt to soar away, and look out for another rook. At such times, especially if the day be warm, the best lures will not bring the falcon to hand, and then is the time for the falconer to keep his eye on his hawk. I have frequently seen my favourite "Vic" ringing up till she seemed a mere speck in the sky, gradually yet surely going down wind. As soon as she spots a rook a sudden change is seen in her soaring. What is known as "shutting in" takes place; her wings being half closed, the downward rush, known as "the stoop" commences; at once the rooks "muster," that is, fly together in a confused flock, seeking any refuge in their fright. On one occasion they rushed to a small thornbush, which was quite black with them; my falconer, however, soon drove out three or four, but the majority preferred to face the crack of his whip rather than the stoop of the "waiting-on" falcon, an event which took place the moment a rook faced the open, and a short flight ended in a kill. On another day, when out in North Norfolk, two rooks were taken in one flight; the first the falcon "bound-to" in grand style, and the second rook drove with such force into a thornbush, that when Captain Thompson took it out, he found that it had been perfectly wedged in by the impetus with which it had entered the cover. Sheep-folds are a favourite "put-in" for a rook, and unless the falconer is well "up," the hawk becomes exhausted and disheartened, by making fruitless stoops at the quarry, which easily avoids her by popping under the hurdles, or into the sheep troughs. In a flight last season, a rook made fifteen successful attempts to avoid the stoops, by dodging in and out of the hurdles; at last however "Vic" was rewarded by killing. To prove to what perfection a falcon may attain, I may mention that the above named hawk has killed thirty-two rooks out of thirty-eight flights. The feet of her quarry may be seen to-day in the mew.

Partridge Hawking.—I must say that I have a very great love for this branch of hawking. The Tiercels, which are the hawks used, are to my eyes very lovely and compact birds; and the great amount of exercise required to follow the hawks throughout a long autumn day, commends it to any lover of true sport, who does not measure the results of the day merely by the largeness of his bag. Some use pointers or setters to find the quarry, but as I am fortunate enough to fly my tiercels over districts in which partridges are plentiful, we merely flush the birds, mark them down as nearly as possible, put the tiercel or cast on the wing, and walk the turnips, or whatever the cover may be, as when partridge shooting.

I once possessed a good cast of tiercels—"Greenfoot," and "Yellowfoot;" they never "crabbed," and they flew at a good pitch. It will give an idea of their powers of flight and footing (for after all the latter faculty is very important), to mention that one day in January, some two years since, we killed five partridges out of eight flights. One was knocked down close to a field of some thirty or more spectators. In the following winter, in one day, we had four flights at snipe, bagging two; one of these flights was a most brilliant one, the quarry being killed at the second stoop.

After a "put-in" on the same marsh, a partridge escaped into some thick bushes, and while we were attempting to flush the quarry, out flew a kingfisher, which, as usual, made for the river, and flew over mid-stream at a great pace. To my astonishment, "Greenfoot" commenced to fly this gaudy quarry, making frequent stoops, which the kingfisher avoided by diving into the water; ultimately it found refuge in a brick culvert. When the tiercel was taken down he was very wet, showing how keenly he had flown his uncommon quarry.

Although a "cast" is usually flown, excellent sport may be had with one tiercel, providing it is a "high flyer," and a "good footer;" it is also essential that he should "wait on" well, and not "rake away" after other birds, such as starlings, larks, etc.; for this reason I would strongly advise brother falconers to eschew snipe-hawking, unless the bird is kept to this particular quarry, which affords a beautiful flight.

In flushing a "put-in" partridge, I use two fox terriers ("Twig" and "Torture"), one being possessed of a truly wonderful nose for partridge. By his actions we know at once if the quarry is at hand, however close the cover may be, and this on the Norfolk coast frequently consists of thick fringes of reeds and sedges, by the sides of the ditches.

A tiercel, such as "Lundy," in partridge-hawking often proves his prowess by flying at other quarry, such as pheasant. Last autumn a partridge "put-in" into some thick bushes and fern, and after a good run, the terriers got in and flushed what proved to be an old hen pheasant. "Lundy," to my surprise, commenced to fly her, and soon killed, footing his large quarry very cleverly. The pheasant weighed 1 lb. 11 oz., while the tiercel only scaled 1 lb. 3 oz.

As soon as this tiercel is put up he is off down wind, giving a novice the idea that he has gone for ever; but, soon turning, he comes up head to wind at a wonderful pace, and at a great pitch; and then is the time to watch his every movement, which can be done through a field-glass. How intently his head turns whenever a small bird is flushed; but such "small fry" has no attraction for "Lundy;" he waits for the first whir-r-r-r of a partridge, and dashes after it in hot pursuit, a kill frequently occurring before another field is reached. There is an old adage, and a very true one generally, which says:—

"When the wind is high
Do not fly."

But a good breeze is the very condition of air under which my "Lundy" is seen to advantage. His grand and dashing stoops from a great pitch in the bright autumn sky, are, to my feelings, what the first rush of a salmon is to the fly-fisher.

Although the heaths in Norfolk afford a grand open country, there is one drawback in them—rabbit-holes; not only is it dangerous to gallop across them, but the earths afford a ready means of escape for the partridges, and I well remember losing three birds in these subterranean passages in one day. In one instance a warrener was close at hand, and from him we borrowed a ferret, but unfortunately a bolt-hole hidden under the bracken escaped our notice, and by this hole the partridge was driven out by the ferret, and the tiercel being on fist, the bird easily escaped.

It had always been my ambition to kill a woodcock with a tiercel, an easy matter in Scotland, I believe, on the hill sides, but in Norfolk (although we have a good many "cock" in November), it is a more difficult feat, as it is rare to find woodcock in the open. On October 20th, 1887, we were walking a piece of turnip with the goshawk, when we flushed a woodcock, which at once flew to a small osier-bed. The goshawk was put down and "Lundy" taken on hand. To the north of the osier-car (as they are called in Norfolk), stretched a large extent of sea-marsh, while to the south were the uplands, but too enclosed for a good flight. Some of the party went round to flush the woodcock; "Lundy" was unhooded, and after a fly round came up and waited on in good style. Soon a well known voice shouts "mark cock," and ere the quarry had flown twenty yards, "Lundy" had made his first stoop, but the woodcock dropped away from the tiercel and put in the osier-car. Being again flushed, he would not face the open, but sought shelter in a ditch, from which he was thrown out and killed on the marsh. We all know the power of the water-hen to "flirt" its tail; this habit was very plainly seen in the woodcock, which, when on the ground, extended its tail feathers in the shape of a fan. This "kill" is admirably depicted in the painting by my artist friend, Mr. Lodge, now exhibited. I could easily mention other curious cases of "putting-in," but I am afraid of wearying you.

Lark-Hawking.—Lark-hawking has been described as Heron-hawking in miniature, and judging from the accounts of heron-flights I have read, I should say that it is a very correct description. I regret that I have no merlins this season of the year to show you; when October comes, the larks then being too strong for them to take, I cut off their jesses, and either let them go, or give them away to friends who may be desirous to retain them as pets. Unlike other hawks a merlin is almost useless in the second season, as they then seem to lose their power of "ringing," and cannot take a lark; at least that is my experience with eyesses. These hawks nest on the ground in the moors in the North, and are allowed to remain "at hack" until they begin to kill for themselves, when they are taken up and trained. They are one of our easiest long winged hawks to train; in some instances, indeed, really becoming too tame. The "hood" is not required for a merlin except in the first few days of training, and not even then with many good tempered ones. Of course all hawks must be hooded when travelling; and the questions sometimes put to us when on a journey are amusing. The common idea appears to be that the cloth part of the hood is the eye of the hawk, and the plume the crest. Some call the hoods "bonnets," and others insist that "they be parrots, Bill, with caps on, a'going to the fair."

The merlin is carried on the fist in a similar manner to the falcon in rook-hawking; that is, the Falconer and Master both carry a merlin on the fist, holding it by its jesses, which for these hawks should be of the lightest leather. When a lark is flushed, both hawks are cast off, and at times I have heard the lark commence to sing, as if in defiance. At all times he faces the breeze, and seems to throw himself at the wind, at an angle, like that assumed by a boy's kite when the effort is made to put it up. It is marvellous to watch the rapid manner in which a lark mounts higher and higher into the air, while the merlins are ringing in wide circles in opposite directions to each other, but still winding their way steadily upward round the well-nigh perpendicular line of flight of their quarry. When there is every chance of a good ringing flight, it is better for the spectator to lie flat on his back, as constantly turning round, looking upwards at the same time, is apt to make one giddy, especially on a warm August day. Should there be only a light breeze, the "put-in," or kill, will be some distance from the spot where the slip took place, but if the day be calm, the whole course in the air may be watched without moving. I well remember a flight of this description in Norfolk. The day was calm, and a few fleecy clouds only slowly drifted across a lovely September sky. A cast of female merlins were slipped at a strong lark, which at once commenced to mount; the merlins throwing themselves wide of their quarry, made every effort to get above the lark; higher and higher went the trio, until at last in mid air they vanished from the ken of the keenest of the party. In a few minutes two spots, some two hundred yards away, were seen coming to earth, one being considerably larger than the other. This proved to be the best merlin, bound to the lark; but the second hawk soon claimed a share of the quarry. After rewarding them, and allowing a rest, we had another good flight, but not nearly so high as the first.

Under date, August 22nd, 1885, I find the following in my notebook:—"Rain giving way about 11 a m., we had a capital day's lark-hawking near Whittlesford, Cambridgeshire, with a cast of 'Jacks' (male merlins)—and a cast of female merlins. A party of five flew 'Favourite' and 'Squealer' (the 'jacks') at a lark, which 'put-in' at an outhouse and was captured. A second lark proved too strong by mounting up above the 'jacks' until they gave up the flight in despair. A third lark 'put-in' among some sheep, and a fourth in a belt of trees. The females 'Ruby' and 'Queen' were tried, with better luck; after several stoops each, 'Ruby' took the first lark flushed, just as it was 'putting-in.' In the second flight the lark commenced to mount, but finding the merlins its masters, sought refuge in a cottage, where a cat took it. 'Queen' did most of the work in this flight, but the birds succeeded in taking separate larks in their third and last flight; 'Queen,' getting a young bird at the first stoop, 'Ruby,' an old one after some hard work and a long flight."

The Goshawk.—Most Falconers are obliged to fly those hawks most suited to the nature of the country in which they reside. In an enclosed and wooded district the Goshawk and Sparrow-hawk are the only ones which can be flown with any success. The latter I kept as a boy, and I am still in doubt which suffered the most—the hawk, from being handled by one who knew nothing of the fine old sport, or myself from the frequent agony of mind, when the sparrow-hawk was left out at nights, or in other words got away, and was lost for the time! But be the country open or enclosed, should rabbits be plentiful, I would strongly advise my brother falconers to keep a female goshawk. No two flights at rabbits are identical, and the variation both in flight and kills when among furze and bracken on a winter's day, is delightful to the true falconer.

We all know how a rabbit can twist and turn when hunted by terriers, but this is a trifle to his wrenches when my goshawk "Shadow of Death" is on the wing; his speed seems to be greatly increased, and the quickness and abruptness of the turns just before the rabbit comes to its "earth" or run, are truly marvellous. After one good season's work a goshawk knows this, and, like an old greyhound, makes a wonderful effort just before its quarry gets home. Captain Salvin, who is a well-known authority on this hawk, once killed four hares in one day with his favourite goshawk "Agrippa." Although the quarry which a goshawk will take is very varied, from my experience I consider it better to confine the female goshawk to rabbits and hares. In illustration of what I mean, I may relate that I well remember flying at waterhens, and then at rabbits, on the same day. "Shadow of Death" killed six waterhens right away, and a pheasant, but when a rabbit was started she refused to fly it, doubtless being on the look out for an easier quarry, but the day after she again flew a rabbit as keenly as ever. The male goshawk takes pheasants well, and instances are noted of its killing partridges, but there is no doubt that a full feathered partridge is in general too quick for any hawk but a falcon or a tiercel. "Shadow of Death" prefers a rat to anything else; in fact, as a lure, nothing is so attractive. I can recall one autumnal day, and a flight at a rabbit, when the quarry escaped into a thick fence, while the goshawk took stand on an old elm tree close at hand. "Old Twig" made a rush in at it, and in a moment or two out bolted, not the rabbit, but a stoat. In an instant this was seen by "Shadow of Death." Away she stooped, killing at once what was anything but a savoury quarry. A squirrel has a strange attraction for our goshawk; it is wonderful to note the quickness with which she can see one, even on the top of the Scotch firs. The slightest movement on the squirrel's part betrays its presence to her, and a flight at one is a perfect illustration of the footing powers in a goshawk; they are scrambling flights, half jumping, half flying, in and out of the thick boughs, ending in hawk and quarry coming to the earth in a confused heap. Any change of dress, or the use of a strange dog, should be strictly avoided, as nothing upsets a goshawk more than such departure from its usual surroundings. I once had a morning's sport ruined by a boy (one of the field) appearing in a blue cap; it seemed to put her out of "yarak;" and when at block, her pet aversion is a brown waterproof!

Success or failure depends very much on the temper of your hawk. The goshawk for instance, being to all appearances in "yarak" when slipped, will not always fly her quarry, or if at all, she flies in a half-hearted manner. Should she be disappointed, she will take stand on the nearest tree, and the most tempting lure will not bring her to fist; yet, notwithstanding this uncertain temper, I believe the goshawk to be more attached to the falconer than any other kind.

In conclusion, I beg to thank you for having listened so patiently to my desultory remarks. I trust that I have not wearied you, but I know that when well "out of hood" and on the wings of my favourite sport, I am apt to forget sometimes that my hearers may not have so keen an admiration as myself for the Falconer's

Art, which *I* maintain to be the most healthful, harmless, and pleasure-giving of all our national field recreations.

I will end with a quotation from a poet's conception, in the first King Charles' time, of this sport of kings:—

> "Ours is the sky
> Where, at what fowl we please,
> Our hawks shall fly."

GLOSSARY OF FALCONER'S TERMS USED BY MR. MANN.

Cast.—A pair of hawks.

Come to.—To begin obeying the falconer.

Crab.—Hawks seizing each other.

Eyess.—A nestling hawk.

Eyry.—The breeding place.

Foot.—To clutch; a hawk is said to be a good "footer."

Get in.—To go up to the hawk after it has killed the quarry.

Hack; to fly at.—The state of liberty in which young long-winged hawks are kept for some weeks before training.

Hood.—Leather cap, used for the purpose of blindfolding or hoodwinking hawks.

Jesses.—The leathern straps fastened to the legs of hawks, by which they are held.

Lure.—That by which the hawks are attracted to the falconer.

Pitch.—The height to which a hawk rises in the air.

Put in.—Is when the quarry is driven to cover.

Quarry.—Game flown at.

Rake.—To fly to wind.

Raking.—Striking the game in the air.

Ring.—To rise in the air spirally.

Stoop.—The rapid descent of a hawk from a height on to its prey.

Train.—The tail of a hawk.

Waiting on.—The hawk to soar in circles above the falconer, in expectation of the game to be sprung.

Yarak.—An Eastern term to signify when the short-winged hawks are in hunting condition.

The President, in thanking Mr. Mann for his excellent address, observed that the introduction of shot guns had no doubt been the main cause of the decay of the noble sport of falconry. He trusted that the efforts of Mr. Mann and others would revive interest in the subject—for his own part while listening to their host's enthusiastic descriptions of past adventures in field and fen, he confessed to feeling many a responsive thrill, and he longed to see a "flight" of falcons, and experience some of the delights of an old English sport which Mr. Mann had so vividly portrayed. He then asked Captain C. H. Thompson (7th Dragoon Guards), of Weathersfield, Essex, an experienced Indian falconer, for his address on:—

INDIAN HAWKS AND HAWKING.

After the able manner in which Mr. Mann has sketched the salient points of Falconry, as carried on at the present day in England and, in fact, Europe generally, it is needless for me to enter deeply into the subject of my present address, for hawking, be it here or in the East, is practised in much the same way, and it is only the initiated who would appreciate the difference in many features of the catching, reclaiming, and training of the Falcon Gentil.

From remote times the East has been the home and stronghold of falconry; Egyptian frescoes and bas-reliefs represent their kings and nobles with hawk on fist. The Chinese have had trained hawks, as well as cormorants, from the earliest days; while in India and Persia, there is not a warrior of old but is represented with his hawk; and so, long before it was ever thought of in Europe—probably before Britain was invaded by the Romans—falconry was practised and flourished in Asia. It is to the far East—to the land of burning suns and cloudless skies, the land of stately palms and the shady mango-tree, where Nature still reigns supreme, and countless myriads of feathered game seem to exist but for the gratification of the ardent sportsman—that I would carry my hearers.

There will be found the "Shah Baz," and the "Bhyree," the former identical with our Goshawk (*Astur palumbarius*), the latter our Peregrine Falcon (*Falco peregrinus*); while the "Morosani," "Douraye," and the "Basha" are the only other hawks used out there that are known to English falconers—the "Morosani," being the Hobby (*F. subbuteo*), the "Douraye," the Merlin (*F. æsalon*), and the "Basha," the English Sparrow-hawk (*Accipiter nisus*).

Besides the above, the Indian falconer can obtain the "Cherrug"—English "Saker" (*F. sacer*), the "Lugger" (*F. jugger*), the "Trumti," the "Shikra," and last, but by no means least, the much-prized "Shahîn." This beautiful little falcon—a specimen of which sits on the block on the lawn yonder—seems to be a first cousin to the peregrine, and divides with it the honour of being *par excellence* the "duck hawk." Often and often have I seen and watched wild fowl on a "jheel" (tank of water), when either a "cherrug," or a "lugger" has been on the wing, and been amused at the contemptuous way in which the ducks go on feeding, as if the falcon overhead were their dearest friend, for they know, instinctively, that no "lugger" nor "cherrug" has ever flown that could cut down the gay-plumaged mallard, or its smaller half-brother, the teal, in open flight.

But let us return to this same "jheel" another day. There are the duck and teal, quietly feeding in the open, and safe in the knowledge that they are just beyond reach of the pellets from the longest ranged guns of the sporting subaltern from the neighbouring cantonments. All at once an old mallard looks up, utters a note of terror—half scream, half quack—and in a moment the erst peaceful scene becomes one of wildest confusion, as every duck on the water makes the best of its way, with outstretched head and flapping wings, to the edging of reeds and sedge that skirts the "jheel." And well they may, for there, high up in the clear azure of a cloudless Indian sky, you can just distinguish a speck—so small that you think it must be a gnat you see—but no! it gets larger and larger, and well-nigh before you have realized what is going to happen, you are aware of a lightning flash of metallic blue, and the falcon has struck down that last duck that just hesitated a minute ere it took advantage of the old mallard's warning note.

The falcon proceeds to feed on the bank yonder, and if you are in want of a good peregrine, or "shahîn," now is your chance. You walk cautiously up to where the falcon has killed—and she will let you get up to within 15 or 20 yards before she flies off and takes perch on the nearest tree, indignantly looking at the robber who has balked her of her meal. You peg the duck firmly down to the ground, with a couple of limed twigs placed thus (*shows*), and retire as expeditiously as possible. Often before you have gone 20 yards the falcon, seeing you retire, stoops at her dinner, and, coming in contact with the limed twigs, gets caught and falls helplessly to the ground. And here I may remark that this birdlime is prepared by the natives from the inner bark of the "peepul" tree (the *Ficus religiosa*), and is far more effective than any that can be obtained in England. Now, having snared the falcon, you run up, and heedless of bites and scratches, secure your prize. Your native falconer, who has probably followed you, produces his "seeling" needles, and the falcon is then and there "seeled," *i.e.*, a piece of sewing cotton is passed through the lower eyelid of each eye, and brought up over the head and tied, so that the hawk for the time being is completely blind-folded.

This is never done in England, on account of the supposed cruelty of the operation; but I am convinced that there is little or no pain inflicted on the patient. The eyelid itself is a piece of skin without veins, and almost bloodless. I have seen the natives "seel" so many hawks, and with such good results, and so convinced am I that it is the best way of treating a wild-caught hawk, that I should have no hesitation in practising it myself. The hawk, utterly blinded for the time, sits perfectly still. The eyelids are allowed to be lowered little by little at the end of a week, when the hawk will sit bare-headed on the fist in the open. Having seeled your falcon, she is conveyed home as soon as possible, supplied with bells and jesses, and handed over by your head "Bazdar" (falconer) to an understrapper, whose duty it is thenceforth to devote his energies to the taming and training of the falcon. This he does by continually carrying the falcon on his fist—night and day—in the most crowded thoroughfares of the bazaar—letting it see and hear all manner of strange sights and noises, all the while speaking to it, and stroking it, and occasionally offering it a small piece of juicy beef or pigeon, until at length the falcon begins to look upon man as not at all the enemy she at first supposed.

I have continually seen my "bazdar," old Wazir Khan, sit up with a new falcon until two or three in the morning, and then be out with it again before six, and carry it all day. There is no doubt that this constant carriage is the way to tame hawks, and anyone who saw my falcons when they first came from India, will remember how remarkably tame they were as compared with English-trained falcons.

The rest of the falcon's taming and training is very much the same as that already described by Mr. Mann—the only real difference being that, in India, hawks and falcons are never taken young from the nest, as in England. They are invariably caught wild in September, trained at once, and let loose again in the following March or April, when the approaching hot weather puts a stop to all hawking, and the Indian falconer releases all his hawks, except, perhaps, a favourite "Shahîn," or "Bhyree," which is sent up to the hills and moulted. All the native falconers are paid off and discharged, and the master betakes himself to Simla, or some other hill station, there to get out of the sweltering heat of the plains, and recruit his energies until the next autumn, when he commences the campaign again with fresh hawks.

In India the wild fowl disappear entirely at the approach of the hot weather, and cross the Himalayas far into the plateaus of Central Asia, where they breed in immense numbers and stay until the autumn rains have again filled all the tanks and "jheels" of India. They return about the beginning of September, crossing the mountain ranges that border India on the north, and gradually spread southward. There, too, may be seen the "Bhyree" and "Shahîn," following in their wake, like a cohort of free lances on the outskirts of a retreating army. When the wild fowl leave in the spring, the hawks retreat from India and build their nests in the inaccessible cliffs and mountain passes of Northern Afghanistan, to return when the duck comes south. Besides wild fowl, the "Bhyree," in India, is flown at the Black Ibis, Heron, Crane, Houbara (a species of Bustard), and occasionally at Hare, while the Shahîn is kept almost exclusively for Teal, although they will show good sport with all kinds of game fowl.

The "Cherrug" and the "Lugger" both leave the plains during the breeding season, and are hardly ever kept to moult, as the natives say, and with truth, that if they are kept through the hot weather they become slow on the wing, and are not worth their salt.

"Jullundri," the saker shown to-day on the block on the lawn, was moulted in the plains last year, and I regret to say that she has lost a great deal of her speed and dash in consequence. She used to kill kite in grand style in India before she had moulted, but now she is too slow for rook hawking in England, although she has killed this quarry.

My bazdar, Wazir Khan, excelled in training sakers to kite. In India every village, hamlet, and barracks swarms with the Fork-tailed Kite, which act as scavengers. A peculiarity of this flight is that a good kite-hawk will stick to the kite she was originally slipped at, although there may be a hundred about all trying to mob her and distract her attention. The kite seeks safety by mounting into the sky, and the falcon steadily pursues the same tactics and mounts in an enormous spiral column, until they often both disappear from sight.

I remember once slipping "Jullundri" at a "jungli" kite—that is, not a kite that is always pottering about a village, but one born and bred in the open wastes, and accustomed to travel immense distances for its daily food, and consequently much stronger on the wing than its village brother. The kite was some thirty yards over my head when I slipped the falcon, and immediately began to ring up in huge circles, and so easily that I thought she looked like beating the falcon by sheer strength of wing. But "Jullundri" meant business, and I lay on my back shading my eyes, and watched them till both disappeared from view. We were left thus for ten or more minutes, straining our eyes, until keen-sighted old Wazir Khan suddenly shouted, "There, sahib! ride," at the same time pointing far away down wind. I could see nothing, but immediately mounted and rode off as hard as my Arab pony could take me. Gradually I saw what I thought must be the falcon, and I was right—for a second later I clearly made out pursuer and pursued coming to earth, a confused mass of feathers and wings. It must have been a battle-royal indeed up there in the skies, far beyond human ken, and I would have given a good deal to have seen the final stoop. Falcon and kite I took up some two miles from where we started.

Very good sport may be had with the "Lugger" at crows, partridges, and paddy birds; but this falcon is not often used by the Indian falconer in India, as it cannot compare for beauty, speed, or courage to any of those I have mentioned previously.

These "Desert Falcons," viz., the "Cherrug," and the "Lugger," are, as I have mentioned elsewhere, not so highly prized as the true falcons, such as the Peregrine and Shahîn, on account of their propensity in a wild state for catching insects. This instinct can, however, be conquered by training, with the result, as I have shown, of excellent sport being derived from them. They require far more work and physicking than the true falcons, and in fact, without occasional doses of physick, would, I believe, be useless to the falconer. The natives are very cunning in their concoction of drugs, and of these they have several kinds —one of the commonest being "goli naushâdar" (sal ammoniac), and another, a blackish compound, smelling much like liquorice. This is the famous "momei" of native falconers, a medicine not altogether unknown to English falconers of former days under the name of "Mummy." I well remember one evening, after the Cherrug had been behaving badly, that old Wazir Khan appeared before me shoeless, clad in spotless white, and, salaaming down to the ground, approached me humbly, with a request for two days' leave. "Why?" "Oh, Protector of the Poor and lord of many men, thy Cherrugs do not fly well; and I, thy head falconer, who am but as the dust under thy feet, require leave that I may go to the City of Indore, there to buy medicine that will give them the heart of a lion, and render them swifter than the swallow." "What's the name of the medicine?" "Hazûr, wuh dawâr ke nâm momei hai"—"Your Highness, that medicine's name is Momei." "And what is Momei, thou son of an owl?" "Hazûr Momei—Momei hai."—"Your Highness, Momei—is Momei," and with this very doubtful explanation I granted the required leave. The next day I cross-questioned the "Munshi," my Oriental pedagogue, and after a lot of beating about the bush discovered that to manufacture "Momei," the fat of a man who had been hanged for murder was required. There was going to be an execution the next day in the Indore State, and this little box, ladies and gentlemen, contains the result of that two days' leave—this is "Momei!"

Both Mr. Mann's and Captain Thompson's addresses were received with great applause, and in proposing a vote of thanks to them, Mr. J. E. Harting (himself one of the best authorities on falconry in England) gave a most interesting account of the method employed by the Dutch falconers to catch "passage hawks" on the great heath or plain near the village of Valkenswaard, lying just in the way of the route of the vast swarms of migratory birds which, as autumn advances, quit Scandinavia and the north of Holland, to winter in the south. Mr. Harting's lucid explanations of this complicated but most effective method of capture need not be reprinted here—the whole story, with illustrative figures will be found related by him in the "Field" for 1878, and also in his most entertaining book, "Essays on Sport and Natural History" (London, 1883). The subject will well reward study by anyone taking an interest in practical natural history.

The meeting ended, we all sallied forth into the meadow, to see a couple of eyess falcons taken from the cliffs at St. David's, which were "flying at hack" until old enough to kill game. Only one of the hawklets could be made to soar, but she mounted into the air in graceful circles, with outstretched wings, until almost lost to sight in the blue distance, and in watching her we could realize some of the pleasures of the ancient sport.

Luncheon was served in a most sumptuous manner in a large marquee specially erected in the park. Mr. Fitch proposed the toast of the "Health of our Host and Hostess," which was enthusiastically honoured—and Mr. Mann in the course of his reply alluded to the pleasures of the "out-of-door" study of natural history, the taste for which he hoped would never die out in the country of Gilbert White. He most cordially welcomed the members of the Club and other guests, and concluded by giving a toast which was always drunk wherever good falconers assembled—"Hood and Leash"—and so with ringing cheers the feast ended.

Mr. Edward Taylor, F.L.S., then took the leadership of the party, and a move was made for the point of embarkation on the barge moored in the Stort very near to Mr. Taylor's residence, "Castle Cottage," which stands on or near the site of the old "WAYTEMORE CASTLE," said to have been built by the Conqueror, and destroyed by King John. Mr. Cussans, however, in his "History of Hertfordshire," judging from its position and the nature of the masonry, is inclined to attribute it to an earlier period. Camden states ("Britannia," 1586) that Roman coins, great quantities of human bones, and an entire wooden coffin have been found in the garden. Mr. Brayley, in his "Beauties of England and Wales," thus writes of it :—"In the days of Stephen this fortress was considered as of some importance, and the Empress Maud endeavoured to prevail upon the Bishop of London to exchange it for other lands, but without effect. King John ordered it to be demolished, but after his submission to the Pope he was obliged to make atonement to the Bishops of London by granting them his manor of Stoke, near Guildford, in Surrey. Some of the out-buildings and other parts, however, appear to have been standing as lately as the 17th century, and the Bishops continued to appoint a Custos, or Keeper, of the 'Castle and Gaol of Stortford' till the time of James I." The principal interest of the place to the pre-historic antiquary is the artificial Mound of earth, which still remains, being about 60 or 70 feet high, of an oval form, and surrounded by a moat, on which stood the Castle Keep.

The party assembled on the lawn between the house and the mound, and Mr. Taylor gave some very interesting details of the history of the place, and read extracts from books and papers in illustration thereof.[4] There were not, so far as he had been able to ascertain, any authentic records to show when or by whom the mound or hill known as the "Castle Mound" was first raised. It had been suggested, and he thought with some reason, that from its shape it was originally two British Barrows, and that these were subsequently joined together by the Romans and used as a fortified place by them. The remains of the walls still existing upon it were evidently early Norman, and they were similar in construction to some discovered in 1850 in the garden close to the present house. He thought it might be stated with certainty that the Castle of Waytemore (or Weymour) stood where "Castle Cottage" now stands, and extended nearly to the moat surrounding the mound—on the latter was, probably, the Keep of the Castle.

Mr. Taylor stated that in October, 1850, the earth was removed from the top of the mound, showing the foundations of the various rooms, and also the well. On that occasion Mr. Roach Smith, F.S.A., Mr. William Yarrell, F.L.S., Mr. Joseph Clarke, F.S.A., and others, were present. Mr. Taylor read the following account of this visit, from the pen of Mr. Joseph Clarke, F.S.A., of Saffron Walden, who wrote the notes down at the time in Mr. William Taylor's house :—

"*Bishop's Stortford, Wednesday, October, 16th,* 1850.—At the town of Bishop's Stortford * * * * is a considerable mound of earth, called the 'Castle Mound' which, although now denuded of all but fragmentary foundations of great durability, thickness, and strength, enough to defy the storms of ages yet to come, once bore a castellated edifice on its apex. The field in which the mound is situated is surrounded by a ditch, the moat of former times; skeletons have been found in various parts of the field, during the operations attendant on culture, and in opening a part of this enclosed ground, nearest the town, for the purpose of extending some buildings, some foundations of great thickness, but evidently only a small portion of those originally occupying the ground, were brought to light—a comparatively modern building being now on the site of the other part which was most likely destroyed to make room for it. Within the foundations now discovered, surrounded by walls of immense strength, is a small and singular compartment extending to a considerable depth below the level of the ground. It is probably not above six feet square, and with the aperture of a drain through the centre of one of the walls at the bottom. On one side of this hole through the wall, which is square with no symptoms of an arch, some Roman bricks are used; on the opposite side the surface is made and the corner turned with thin mediæval house-tiles used after the Roman fashion. The walls of this cesspool (probably) are of flints, some of them faced, and a few pieces of hewn oolite (Rutlandshire). The mortar is of a very coarse description, containing a great proportion of yellow sand. In the cesspool were found the bones of the domestic fowl, the horse, hog, sheep, and deer, and also part of the antlers and other bones of a large species of stag, and a full sized human skeleton, with that of a child and the fragments of middle age pottery, together with a few pieces of rude Roman vases, plainly indicating that although the work is of a mediæval character, the Romans had previously been occupants of the locality. This compartment was the only one which retained its original dimensions, the others having been broken up more or less. Leading from these foundations and in the direction of the Mound is an elevated ridge, which in making a trench through was ascertained to be a raised causeway, composed of shingles on coarse gravel to a considerable depth. By the side of *this* three human skulls and parts of skeletons were discovered, but very slightly covered with earth, as if the result of strife and a hasty interment. The surfaces of the teeth (which were sound) of these skeletons were ground down quite flat and even, as if from masticating very hard and unground food—amongst the poorer and hardest livers such instances of abrasion could not be now found. The Mound itself is an object of much higher interest, as by comparison with the Barrows (four in number) at Ashdon, Essex, called the 'Bartlow Hills,' it is not unlikely that this may turn out to be a Roman (or earlier) Tumulus, of that order called a Long Barrow. The masonry on the top is of the same date, workmanship, and materials as those already described, with now and then a fragment of Roman material—the index of some former castrum and one decidedly of early Norman date. It would not at all accord with modern notions of security and strength to place walls of immense thickness and weight (as the remains indicate them to have been) upon a *newly raised* mound of loose earth; therefore, it is but a fair inference to draw, that the hill existed compact and firm, from the length of time it had taken to consolidate, ages before it was burdened with the coronal of massive walls of which little more than the foundations now remain. The hills at Bartlow were ascribed by tradition to the Danes, until they were opened about eighteen years ago by the late Mr. J. Gage Rokewood, and demonstrated to be undoubtedly Roman.[5] Those who have visited and examined these barrows will have observed that they were evidently cast up principally from the ground around, and will not fail to notice, most distinctly marked, the line which divides the natural earth from the artificial mound; and taking advantage of this defined appearance the explorers were enabled to go direct to the cist which in all these four instances was ascertained to be deposited on the natural level and the earth raised over it. A glance at the mound at Bishop's Stortford will suffice to show that the same base line is distinctly to be traced, varying a foot or two above the pathway around it. This point is in a fair way of being elucidated, as the owner of it, Mr. William Taylor, has engaged at the leisure time of the year to tunnel it from end to end."

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[4] Among other papers he read a letter from the late William Yarrell, V.P.L.S., dated April 4th, 1850, addressed to Mr. W. Taylor, giving some extracts from the Proc. Roy. Soc. Arch. Antiq. concerning Bishop's Stortford.

Mr. Taylor regretted that the systematic excavations hinted at in the concluding paragraph of Mr. Clarke's notes had not yet been carried out, but in digging at the "Cottage" a few years ago more foundations were brought to light, and it was found that some of the walls of the present house were of the same kind of flint work. The present house appears to have been built when the "prison" was pulled down in Elizabeth's time, and was first used as an ale house, being still open as such by the sign of the "Cherry Tree" at the beginning of this century.[6] Mr. Taylor said :—"There was a cherry orchard there, and my father, the late Wm. Taylor, has told me that he remembered as a boy paying a penny to go in and eat cherries. I believe that the 'dungeon' was under the front part of the Cottage, and was no doubt used as a cellar, but was afterwards filled up when the

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[5] See "Archæologia" xxv, 1, and xxvi, 300.

[6] "The Prison called Bishop's Hole or the Convicts Prison which served as a gaol to the parishes under the Bishop's Bailiffs, and was last used by the Monster Bonner, is a cellar in the ale house below the hill, the wall three feet thick."—Camden's "Britannia," 1586.

Town Mill was built, on account of the floods thereby occasioned." Mr. Taylor exhibited maps and plans in illustration of his remarks, and produced some copies (made by Mr. J. L. Glasscock, jun.) of original sketches by a Mr. Kerrick (1800), in a MS. in the British Museum, of the Mound as it then existed.

The large party then embarked on board the barge, which had been very kindly lent for the occasion by Messrs. John Taylor and Son, and fitted up under the superintendence of Mr. Marshall Taylor. The barge was drawn by two horses, and the voyagers could, in a very pleasant way, view the course of the river from Bishop's Stortford to Harlow. A somewhat sharp shower came on just at starting, but the sky soon cleared, and the latter part of the trip was carried out under favourable conditions of weather.

The STORT is one of the main tributaries of the Lea. It is formed principally by the confluence of two streams, one rising from a spring in Clavering Park Wood in the village of Langley, in Essex (receiving a brook flowing from Scales Park Wood in Herts), and the other near Henham and Elsenham, in Essex. The two main streams join at Pesterford Bridge, Stansted Mountfitchet, and forming the Stort the river flows by Stortford, Sawbridgeworth, and Harlow (where it receives the Pincey Brook, from Hatfield Broad-Oak) to Roydon, where it falls into the Lea. The composing streams are almost wholly in Essex until Stansted Mountfitchet is reached, but from thence, until its junction with the Lea, the river forms the boundary between Essex and Hertfordshire, excepting at Hockerill, and the place near Sawbridgeworth where Hertfordshire trespasses over the eastern border in the shape of a small piece of land upon which Hyde Hall stands. There was formerly a mill at Bentfield End, on the Hassobury estate, but this was pulled down some years ago. The first mill on the Stort now standing is the "Parsonage Mill," in Hockerill parish. There are in all thirteen mills, viz:—

Parsonage Mill.
Town Mill, Bishop's Stortford.
South Mill.
Twyford Mill.
Tednanbury or Silk Mill.
Sawbridgeworth Mill.
Shearing Mill.
Harlow Mill.
Latton Mill.
Burnt Mill.
Parndon Mill.
Hunsdon Mill.
Roydon Mill.

The Stort was made navigable in 1769 for barges of 40 tons burden from its junction with the Lea to Bishop's Stortford, at the instance and expense of Sir George (then Mr.) Jackson (afterwards Sir G. Ducket) and Mr. Dingley, each having three shares. The works were commenced in 1764, and the river was opened for navigation with a procession of barges amid great rejoicings on October 24th, 1769. The cost of the work was estimated to have been £100,000. Mr. Taylor stated that his brother, Mr. Marshall Taylor, had in his possession a silver tankard on which was this inscription:—"The gift of the proprietors of the Stort Navigation to Mr. John Glyn, their superintendent, as a token of their approbation of his conduct in the progress of that work, 1768." Mr. Taylor also read from Sir G. F. Ducket's book "Ducketiana" extracts from the diary of the projector, giving some interesting details of the opening of the navigation. Sir George Ducket's epitaph is in St. Michael's Church, Bishop's Stortford. He died in 1822, aged 97; he was a great friend of Captain Cook, who named Port Jackson, in New South Wales, and Point Jackson, in New Zealand, after him. In 1787 Sir George

Jackson bought Mr. Dingley's three shares for £6,750, and became sole proprietor, the venture up to that time not having paid any interest. The property afterwards passed to the Gurneys of Norwich, and a few years since to Messrs. Truman, Hanbury, Buxton and Co., who are the present owners. In 1779 and 1780 the City of London caused a survey to be made by Mr. R. Whitworth of the country between Bishop's Stortford and Cambridge, with a view to extend the navigation to the latter town, the canal to be called the North London and Cambridge Junction; the estimated cost was £567,000. The plans are still in existence, but the advent of railways and other causes put a stop to the project, which has never been renewed. There are not wanting signs of a revival of interest in canals and navigable rivers, and it is sincerely to be wished that so natural and pleasant a mode of conveyance may yet have a bright future before it.

An account of the natural history of the Stort valley must be left for a future occasion. Many parts of the river are very picturesque, in the quiet pastoral manner, and the water meadows and banks abound in interesting river-side and marsh plants. These will be found catalogued in Gibson's "Flora of Essex" and the recently published "Flora of Hertfordshire." During our little voyage but scanty time could be allotted to botanical observations, and Prof. Boulger's note-book contained but little beyond the fact that *Iris pseudacorus* was seen plentifully in the ditches, and large trees of alder were noted on the banks in some places; and near Sawbridgeworth a fine tree of *Euonymus europæus* (the spindle) attracted attention. On the walls of one of the locks near Harlow was a splendid crop of *Marchantia polymorpha* (one of the Hepaticæ) in full "fruit," *i.e.*, with numerous archegonial branches. The only insect worthy of special note was taken near this spot by Mr. White—a specimen of *Osmylus chrysops*, a rather uncommon relative of the pretty but ill smelling "lace-wing flies" of our gardens and orchards.

About midway between Stortford and Sawbridgeworth a break was made in the voyage to enable the party to examine WALLBURY CAMP, which lies on an eminence on the Essex side overlooking the river. This earthwork comprises about 30 acres, the circumference being not less than three-quarters of a mile; the ditch is double, in some places of great depth and width, and well preserved except on one side, where it has been filled up for agricultural purposes. Morant states that "the precipice on the north has some additional work on the brow of the hill; the other three sides seem to be in their original state." Mr. Roach Smith has called attention to what may be called postern entrances on the side facing the Stort, intended apparently (as Mr. F. Rivers suggested) for cattle and horses to descend to the low ground for water. It is stated by the author of the "Excursions in Essex" that the area of the camp was a rabbit warren until ploughed up and divided into fields, many years ago. At the north-west corner is a farm house, "the south part of which, especially the cellar, is built of rough but strongly compacted work in which are some sharp-pointed arches."

This "camp" has long been known, and has been commonly called Roman by the compilers of histories of the county. Dr. Salmon laboured to prove that here was the Aluana Silva of the monk Ravennas, and brings arguments forward to prove the Roman theory, the most pertinent being that a path from the north-east corner of the camp (shown on the Ordnance map) opens into a lane called "Port-lane" (which runs from Wallbury towards Hallingbury-street, in the direct way to the "Stane-street" leading from Stortford to Colchester), and that the adjacent lands are known as "Port-lane Fields." He adds that "in Beggars-hall Coppice, on the forest [Takely Forest], in the way to Stane-street, is a small spot of ground called Porting-hills and Portingbury-hills. At a little distance from that are the traces of a large circular entrenchment." The Hon. R. C. Neville, F.S.A. (afterwards Lord Braybrooke), states in his "Sepulchra Exposita" that it was reported in one of the topographical works on Essex that more coins of Cunobeline had been found in this locality than any other; but judging from the following information communicated to him by Mr. Frye, of Saffron Walden, this statement appears to be entirely erroneous:—

> "Enquiry was made of old men at plough, near this spot, and of persons met and called upon on the way, who said they never heard of any coins or curious old things being found in or about this place. Mr. John Platt, an old inhabitant of Bishop's Stortford, watchmaker, who has been in the habit of purchasing coins, never heard of any being found at Wallbury. * * * * The Rev. J. Hutchinson, the venerable vicar of Sawbridgeworth, being called upon, says that his relative, Sir H. Dryden (an antiquary), has visited this spot, and made careful memoranda respecting it; of whom more information, perhaps, might be obtained. * * * * The camp must have been a very strong place, yet no Roman antiquities have been met with, and there is no appearance of barrows."

Some of the members made a careful examination of the earthwork, aided by the large scale Ordnance maps kindly provided by Mr. Taylor. On the embankments are many old trees, and notably some grand hawthorns, and in the centre of the camp stands a fine Holm-oak (*Quercus ilex*), with its leaves riddled by larvæ of the small moth, *Lithocolletis mesaniella*. The view from the western side, looking down into the valley of the Stort, gives a striking idea of the boldness of the embankments, and the great labour that must have been employed in throwing them up.

No conclusions of any value as to its age can be arrived at by merely tracing the outlines of the earthwork; a thorough examination with pick and shovel would be the only means to obtain reliable information, and the hope was expressed that the Essex Field Club might ere long be in a position to take the matter in hand. In describing the earthwork we have applied to it the conventional word "camp," but from consideration of its size, etc., it is evident that it could not have been a mere military fastness—it would have required an immense body of men to effectually defend such an extent of ramparts. Mr. Roach Smith has some valuable remarks in an account of his visit to this place in the "Gentleman's Magazine" for 1865 (pt. ii., pp. 760, 761), which apply to so many of the so-called "camps" in Essex that we cannot do better than close with them our summary of the meagre information extant concerning this remarkable vestige of ancient life. Mr. Smith says:—

> "Wallbury is a fine and good example of those fortified places which are usually called Roman. It would be easy to cite dozens of instances, but for the present purpose one at hand may suffice. Hasted in his 'History of Kent' writes:—'At Oldberry (near Ightham) there are the remains of a very considerable entrenchment, which is, without doubt, of Roman origin. It is of an oval form, and contains within its bounds the space of 137 acres.' This may be said to be unusually extensive, but it is clear that they all belong to a certain class of fortifications constructed upon one and the same principle. It seems that a consideration of the number of troops required to defend these camps called Roman, has never entered into the minds of those who have so termed them. Such places would be mere traps in which weak garrisons could be taken at any time by a strong besieging force; and situated as most of these earthworks are, it is difficult to understand what strategic purpose they would have answered in the hands of Romans. Hod Hill, in Dorsetshire, is an interesting exception, but

that is not of Roman origin; the Romans used it and drew their camp within it; but at Wallbury, Oldbury (near Ightham), and other similar places, we never find the slightest Roman remains, such as were always met with where Roman soldiers were stationed. If we consider these places as British, they can be well understood. They are sufficiently extensive for a large population, and for the protection also of cattle and horses; in short, I think we may recognise in them British *oppida*; and this view is identical with that of my friend Mr. Charles Warne, who has studied so closely and so successfully the ancient earthworks of Dorsetshire."

Tea was served on board the barge near Harlow Mill in excellent style by Mr. Glasscock, of Bishop's Stortford, and after votes of thanks had been most heartily passed to the conductors, to Mr. Marshall Taylor, and others, for their labours in connection with the meeting, the company bade "good-bye" to their kind friends from Bishop's Stortford, and made for the railway station to catch the 8 o'clock train from Harlow. The town is noted for the fair held on Harlow Bush Common. Roman coins and other antiquities have often been found there, and a quantity of Roman tile is built into the south side of the church. Harlowbury Chapel, now used as a barn, "is a small and almost perfect Norman structure, picturesquely overgrown with ivy. It was probably built originally as a halting-place for the Abbots of Bury St. Edmunds on their way to and from London"—so says Mr. Christy in his "Handbook for Essex." But there was no time to spend in further antiquarian sight-seeing, and to some of us Harlow will be more vividly associated with the story in one of Thackeray's "Roundabout Papers," which Mr. T. V. Holmes recalled to our memory as an appropriate anecdote with which to close the story of the Club's doings on the Stort. In the paper styled "On a Medal of George IV." Thackeray remarks:—

"During the Exhibition time I was stopped by an old country woman in black, with a huge umbrella, who, bursting into tears, said to me, 'Master, be this the way to Harlow in Essex?' 'This the way to Harlow? This is the way to Exeter, my good lady, and you will arrive there if you walk about 170 miles in your present direction,' I answered courteously, replying to the old creature. Then she fell a-sobbing as though her old heart would break. She had a daughter a-dying at Harlow. She had walked already 'vifty-dree mile that day.' Tears stopped the rest of her discourse, so artless, genuine, and abundant that—I own the truth—I gave her, in I believe genuine silver, a piece of the exact size of that coin which forms the subject of this essay [a half-crown]. Well, about a month since, near to the very spot where I had met my old woman, I was accosted by a person—a person in black, a person in a large draggled cap, a person with a huge umbrella—who was beginning, 'I say, Master, can you tell me if this be the way to Har——,' but here she stopped. Her eyes goggled wildly. She started from me as Macbeth turned from Macduff. She would not engage with me. It was my old friend of Harlow in Essex."

A Stinging Ichneumon.—One June 25th I was taking a few Ichneumons off the heads of *Heracleum sphondylium* with my fingers, as is my usual custom, when a female *Paniscus testaceus*, Gr., gave me such a prick that I was glad to relinquish my hold upon it. Upon capturing it a second time to make sure of the species, the sting was repeated, and the top of my first finger twinged smartly for over an hour. Mr. John B. Bridgman records ("Entomologist," xi., 35) that a female *Cryptus obscurus*, Gr., gave him as sharp a sting as a wasp would have done. Although I have captured many hundred ichneumons, I think this is the first time that I have been seriously attacked by one.—EDWARD A. FITCH, F.L.S., Maldon.

"Mældune in Essex." *From a drawing by* H. A. Cole, *September*, 1888.

Hazeleigh Church, Essex. *From a drawing by* H. A. Cole, *September, 1888.*

Visit to Maldon and the Blackwater Estuary, Friday and Saturday, September 14th and 15th, 1888.

Owing to the happy accident of our President, Mr. Fitch, being this year chosen Mayor of Maldon, the Club was enabled to visit this ancient town under peculiarly favourable circumstances, and the members and friends who were fortunate enough to be present thoroughly enjoyed the first two-days' excursion held since the establishment of the Society. Mr. and Mrs. Fitch took the liveliest interest in all appertaining to the meeting, and to their kindly and thoughtful arrangements its success was mainly due. The Secretaries and one or two other members went down to Maldon a few days before the meeting, to attend to the business details, and to visit the chief places mentioned on the programme. Mr. Fitch had engaged the yacht "Matilda" (belonging to Mr. Sargeant), and trips taken in the neat little craft enabled the conductors to see more of the Blackwater estuary than otherwise would have been possible. A sojourn in the town also allowed time for Mr. H. A. Cole to make a series of sketches, some of which are reproduced in the present number, and which he has kindly presented to the Club.

The main body of members reached Maldon on Friday afternoon by the noon train from London, some joining *en route* or by road during the evening, and many came over from Colchester, Chelmsford, etc., early on Saturday morning. The "head-quarters" were fixed at the "King's Head" Hotel, where the landlady, Mrs. Revett, did all in her power for the comfort of her visitors; but owing to the largeness of the party many members of it were quartered in other inns and in private lodgings. However, the numerous delicate problems of "billeting" were at length solved to everyone's satisfaction, and the official business of the day began at the Moot, or Town Hall.

Maldon is one of those modest little towns, shadowed o'er with the mantle of "Dear Lady Quiet," which happily still flourish in many parts of rural England. It stands on the ridge of the southern banks of the Blackwater, and with its red roofs, church towers, and river-side "hards" crowded with old-fashioned shipping, the town, as seen from the river, wears an air of picturesque age, signs and seasoning of antiquity which a glance at its history abundantly confirms; its only rival in this respect in Essex (if not in England) being the neighbouring town of Colchester—the British Camulodunon. Two principal rivers mingle their waters to form the Maldon Blackwater—the Pant, which rises near Wimbish, and the Chelmer, from near Debden and Thaxted: this last river was made navigable to Chelmsford in 1797. The rivers expanding into a broad estuary afford to Maldon all the facilities and gain of an excellent port for vessels of considerable size. It was on the banks of the united rivers (as Mr. Fitch told us later on) that Unlaf, the Viking, met and conquered the noble Brihtnoth, the Ealdorman, and the heroic passage of arms is recorded in deathless verse in the "Song of Maldon," one of the "noblest efforts of Teutonic poetry." It is as the scene of this battle, so well pictured by Freeman in his "Norman Conquest," that Maldon owes its niche in history: the town's subsequent life has been one of sober and uneventful industry, and its burgesses, wisely eschewing the dangerous political partisanships of some of their neighbours, have retained their ample charters and privileges from legendary times, almost, of English story to the present day.

The Moot Hall is an interesting red-brick building, dating from the early part of the fifteenth century. It was erected by Sir Robert D'Arcy (M.P. for Maldon, 1st Henry VI. (1422), Sheriff of Essex and Herts in 1420; died 1469), and is still sometimes called the "D'Arcy Tower." It is referred to in a deed in the possession of the Corporation, dated 27th January, 18 Hen. VI. (1440). The company assembled in the Quarter Sessions room (the Council Chamber being under repair), and accommodation was found for them on the bench, round the advocate's table, and even in the dock! Here they were received by Mr. Fitch, wearing his robes and chain of office, in his dual character of Mayor of Maldon and President of the Club. Here also Mr. J. C. Freeman, the genial and popular Town Clerk, displayed fourteen of the seventeen Royal Charters which had at various times been granted to the Borough, some of them being fine specimens of illumination and penmanship, especially those of Henry V., Henry VI., and Henry VIII. The earliest known Charter (that of Henry II.) has been unfortunately missing for fifty years past, but Mr. Fitch stated that he had strong hopes of finding it in the muniment-room on the first wet day convenient for a search. The Charters exhibited consequently commenced with the second, dated 6th June, 1290; but the comparative completeness of the series, and the good condition of the deeds, is a remarkable example of careful wardship, and in 1836 Sergeant Merewether wrote: "I have rarely, if ever, seen an instance in which the records of a borough were so numerous, so ancient, and so satisfactory as those of Maldon."

Other objects exhibited were the fine Mace of silver, "parcel-gilt," made by Francis Garthorn, a famous worker in plate, and presented to the town in

1687 by John Pound, then Mayor; two constables' staves, with silver heads; the Common Seal of the borough, dating from 1682; a plaster impression of the old seal (now lost), used when the borough had Admiralty jurisdiction (exhibited by the kindness of Mr. George Crick); an old watchman's lanthorn of wood, and a curious cylindrical alms-box, with chains attached, of unknown age, but which is supposed was hung outside the debtors' prison in the Moot Hall for receipt of subscriptions from passers-by. The portraits usually hung round the Council Chamber were packed away in consequence of the repairs, but the fine portrait of Queen Elizabeth in her younger days (æt. 30-35), probably, as Mr. Crouch surmised, by Zucchero, and the portrait of Dr. Plume, the founder of the library, were shown.

In taking the chair, the Mayor most heartily welcomed the Club, and by way of introduction to the proceedings of the meeting, he delivered an address on the history of the town, of which the following is an abstract[1]:—

SHORT NOTES ON THE HISTORY OF MALDON.

The early history of Maldon may be summed up, like that of so many other East Anglian towns, somewhat as follows:—Maldon was founded nearly 1,000 years ago (913-920 A.D.) by Edward the Elder, who chose for the site of his castrum (burgh) a place formerly occupied by the Romans, but desolated successively by the Saxons and the Danes. Of Roman Maldon we know but little, and it probably was not a place of military importance; its claim to having been the flourishing Colonia Camulodunum, and previously the "royal town" of Cunobelin, the capital of the southern part of the island, advanced by that father of English antiquaries, William Camden, cannot be substantiated, but must be conceded to Colchester. We have at Maldon no known remains of a Roman building, although Roman bricks are found in the walls of St. Giles' Hospital and St. Mary's Church, the former specimens being noteworthy for their fine colour and texture and large size. Roman pottery and Roman coins have been found in various localities, more especially north of the river at Heybridge. The only two amphoræ in the Colchester Museum are from that locality; one is 18 inches in diameter and 19 inches high (broken), presented by Mr. I. Belsham; the other is 38½ inches high, and was presented by Mr. E. H. Bentall. There is a similar one in the Chelmsford Museum from the same source. Several stone coffins of the Roman period were also found at Heybridge during the building of the "Towers" (Mr. Bentall's mansion). Several Roman terra cotta lamps have been dug up at Maldon; there is a very good one in the Colchester Museum, with the figure of a wild boar upon it. Fragments of Roman pottery were lately found six feet deep under the floor of St. Mary's Church during the restoration, and within the last two months hundreds of Roman coins, and barrow loads—I might almost say truck loads—of pottery (few pieces perfect) have been turned up during the works for the new railway between the river and the existing lines. The pottery was of all descriptions, from the figured brittle, but valuable, red glazed Samian ware and the blue-black Upchurch ware, to the white and yellow Romano-Salopian ware, which occurred but rarely. The common unglazed earthenware utensils were abundant, and many contained coins. A valued gold coin was found at Maldon, which (at any rate, previous to the time of Morant) "was regarded with so much veneration that it was always consigned to the care of one of the bailiffs for the time being." White in his "Gazetteer of Essex" (1848) tells us that "since Morant wrote, this ancient and valuable coin has been lost." Whether this was a correct statement at that time I cannot say, but at any rate the coin is safely in the keeping of the present Mayor, who hopes to deliver it over with the other insignia of office to his successor. I now exhibit the relic. It is a gold coin, in excellent preservation, of Nero and Agrippina, with their two heads on the obverse, and a male and female figures, in a quadriga of elephants, on the reverse: date, of course, about A.D. 55 (Nero 54-68).[1] A coin of Vespasian has also been found in Maldon.

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[1] The full text of Mr. Fitch's address has been reprinted from the "Essex Standard" report of the meeting in the form of a pamphlet—Colchester, Benham and Co.; Maldon, R. Poole, High Street.

Possibly the only record we have of Saxon Maldon is that which exists in its name—Saxon, *Mæl-Dun*, the "Cross-hill," from a cross which was supposed to have then stood in the highest part of the town, or it more probably may have been from the roads crossing on the top of the hill, as now. Saxon urns and coins have occurred in several localities, but most commonly at Heybridge. I cannot learn whether the "fine gold Druidical coin" found near "Maldon Hall" is British or Saxon. There is an interesting Saxon urn of the Frankish type, decorated with projecting bosses, in the Colchester Museum, to which it was presented by Mr. E. H. Bentall.

We have no history of the Danish conquest of Essex, but we know that here was one of the chief seats of the Danish power, and Camden has perhaps not greatly libelled these pirates when he says, "About the time of Egbert (827-834 A.D) they landed with such tumults and hurliburlies as never the like was heard of, having for many yeares made foule havvock over all England, razing cities, firing churches, and wasting countries, they let out the raines loose to all barbarous cruelties—driving, harrying, spoyling, and turning all upside down wherever they went."

In later and historical Saxon times, in the course of the reconquest of the Danelaw, we have documentary notices of the camp erected here in 913 by Edward the Elder. Henry of Huntingdon gives us this:—"Eodem anno scilicet Edwardus fil. Alfredi construxit Burgum quemdam, Witham, in Essexia, et interea manebat apud Mealdune et ei subdita est magna pars gentis illius quæ prius erat in subditione Dacorum." Under date 913 the Anglo-Saxon Chronicle says, "And then (after the Hertford Burg was finished) during the summer, between Rogation days and Midsummer, King Edward went with some of his forces to Mældune in Essex, and there lived the while the Burg at Witham was wrought and getimbred."[2] In 920 Edward again encamped at Maldon. He rebuilt and fortified the town, and according to Marianus, built a castle here, of which we now know nothing, unless the camp is again referred to. In 921, after the massacre at Colchester by a large army of the Danes, they besieged the camp without effect; so it was probably of considerable strength. When forces came to its relief great numbers of the enemy were slain, and the Saxons then avenged their Colchester brethren.

Doubtless, throughout this unquiet tenth century, Maldon and the adjacent country was the scene of numerous struggles between the Saxons and Danes, as it is with every probability believed that Mersea Island and the Blackwater estuary was for many years the headquarters of the Danes in Britain, and Maldon was the first important Saxon entrenchment to be overcome when they made their frequent inland incursions. Coming to the year 993, the Saxon chronicle records that "this year came Unlaf with 93 ships to Staines, and laid waste all around, and thence he went to Sandwich, and thence to Gypswic [Ipswich], and harried it all and so to Maeldun; and then Byrhtnoth, the Ealdorman, and his force came against him and fought with him, and there they slew the Ealdorman, and kept the battle field." The chronicle of Ely tells us this battle lasted 14 days, till at last the Danes killed Brihtnoth and cut off his head. Its great interest to us is that we have, in the "Song of Maldon," an almost contemporaneous historical fragment describing this fight, with even the speeches of the warriors; and the faithful description of the ground on which it was fought shows it to be at any rate the words of an eye-witness, or one who obtained his information at first hand.

Coming now to the Domesday general survey, we learn that Maldon was a half hundred, according to its jurisdiction and taxation, as was Ipswich. Colchester was a hundred. Here we have undoubted information of the owners of the land, its extent, and the population, in the reigns of Edward the Confessor and of William the Norman. Mr. Fitch gave details of possessors of land in Maldon from the Domesday Book of Essex, and showed from it that this borough, like most others, belonged to the king, and that at the time of the survey the hall and houses were rented to the burgesses. The last of the De Mandevilles, who died in Normandy in 1189 or 1190, in view of his great possessions in Essex, procured from Henry II. the first Charter of Maldon, which is stated to be confirmatory of such privileges as were granted "by Henry our grandfather." The charter (which is now either lost or mislaid) conferred most ample privileges, and granted manifold exemptions from the usages of feudalism, which pressed so hardly on the rest of the country, which must have made a Maldon freeman feel himself indeed a citizen of no mean city. With these privileges the borough probably became a prosperous community after the troublous times of the long Danish wars. Mr. Fitch read a translation of the charter, made by himself; it is dated at Pembroke on the 7th day of October. The precise year has been a subject of dispute, but Mr. Fitch gives reasons (in the reprint of his address above alluded to) for thinking that it was 1171, not 1155 as commonly stated. Mr. Fitch also recited the various confirmatory charters, extending from Edward I. (6th June, 1290) to George III. (8th October, 1810), and explained the custom of landcheap, which was a payment to the Chamberlain of 10d. for each mark of the price of land at every alienation within the borough, and which from a reference in an ancient grant of Henry I. or IV. (probably the latter) appears to have been originally granted by William Rufus, and was enforced until 1615, when it fell into abeyance.[4]

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[1] In Gibson's additions to the "Britannia" it is stated that "in a garden at Maldon was found a piece of gold almost as large as a guinea. It has on one side Nero, and on the reverse Agrippina, and is very exactly done." Possibly this was the borough coin.—ED.

[2] See some remarks on this point in Mr. Spurrell's paper on "Withambury" in ESSEX NATURALIST, i., pp. 19 22.—ED.

Maldon returned two members to Parliament from the year 1329 (3rd Edward III.) until its representation was reduced to one member by the Reform Act of 1867, and by the redistribution of Seats Bill of 1885 we lost our separate representation, which was merged in the county division. Again shorn of some of our administrative privileges by the Local Government Act of 1888, Maldon still retains its Corporation and separate Quarter and Petty Sessions, and I am sure you will all wish that this ancient and loyal Borough, which has left its mark on the history of the county, may long continue.—FLOREAT MALDONA.

A very hearty vote of thanks to the Mayor for his address was carried, on the motion of Mr. G. F. Beaumont and Mr. Crouch, and the party then ascended to the leaded roof of the Moot Hall (noticing the newel staircase, with moulded brick hand-rail, supposed to be almost unique) to gain some idea of the geography of the country they were about to explore. From this coign of 'vantage a most extensive prospect was obtained, ranging over the eastern part of the county from the Thames to the Colne, and the landscape, seen in the calm brightness of an autumnal afternoon, was certainly a fine and varied one.

From the Town Hall the party went to ALL SAINTS' CHURCH, where they were received by the Vicar, the Rev. E. R. Horwood, who with the assistance of Mr. Crouch and Mr. Fitch, explained the many features of architectural and historical interest of the building. The church has suffered more from the vandalism of the past, and the still more destructive recent "restorations," than from the effects of time. Monuments have been demolished wholesale, brasses removed, and the ceiling of the chancel has been decorated with a gorgeous array of stars on a blue ground. It is a spacious Early English building, with nave and chancel separated from the D'Arcy Chapel by an arcade of arches supported by slender clustered columns of Purbeck marble in which minute shells can be clearly distinguished.

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[4] One very remarkable custom formerly obtained in Maldon (as well as in Woodford and probably at other places in the county), viz., that the copyhold tenure was what is known as Borough English, the youngest son, and not the eldest, succeeding to his father's estates—"the olde auncient and lawdable custome of this Burrough is and hath byn tyme out of mynde of man, that if the father die seized in a howse or land within the franchise of this Burrough, the yongest sonne of the first wiffe shall have the heritage," etc.—ED.

The D'Arcy Chapel and south aisle are of the Decorative period, the carving of the windows is continued in the wall spaces, beneath which is a fine double series of sedilia (*temp.* Edward I. or II.) with an entrance to the crypt or small mortuary chapel beneath. The most interesting feature of the edifice is the *triangular* Norman tower, crowned with an hexagonal spire, which is believed to be unique, at least in England. It opens by a large arch into the nave. The chancel leans to one side, like many of the Suffolk churches; a feature somewhat fancifully said to be emblematical of our Saviour's head reclining on the Cross. Mr. Horwood gave an account of the numerous monuments and their local associations, the oldest being that to Robert D'Arcy (1428), whose son, Robert D'Arcy, of Danbury, founded three chantries here, and built the Moot Hall. On blocks of white Smyrna marble are Latin inscriptions, telling the family story of a Maldon worthy, who amid the dangers and cares of his successful mercantile wanderings, retained a love for the beauties of nature and art—one John Vernon, Turkey merchant, "who hath often crossed the seas, tempted thereto not so much by the love of gain, as by an ardent desire of beholding the wonderful works of God in the deep. He boasts of this sepulchral stone as not the least reward of his labours, being discovered among the ruins of Smyrna. He also brought to light some choice ancient manuscripts, monuments of this antique city; with these he enriched his native country. He is now safe arrived at the haven of rest. He died, January 28th, 1653, aged 84." On a mural monument is an inscription to Mary Vernon, who, "being in labour with her third child (O, sad !) ended her days 1st November, 1647, aged 29, and waits for the faithful promise of her return. Her once happy husband, John Vernon, gentleman of this town, caused her to be placed under the marble beneath;" and then, to complete the pathetic story, comes the simple history of the little "John Vernon, whom his mother brought forth, at the expense of her own life, not enduring, as it were, an existence so unkindly given, died almost as soon as born, and was buried with his mother under the same Smyrnean stone." Another monument recalls a romantic legend: it is the effigy of Thomas Cammocke, of Maldon, born 1545, with his two wives, Ursula and Frances, kneeling. The latter is reputed to have been the daughter of the Earl of Warwick, and the story runs thus:—"The Earl of Warwick, going from Leighs to Rochford Hall, was attended by Captain Cammock, who courted his daughter, and who carried her off upon a horse, and came to Fambridge Ferry, where the boat was on the other side, and the tide violent. They found themselves pursued, and had no shift but to swim over. The captain advised her not to venture, but she said she would live and die with him, and took the water. When they were half over, the Earl's servant came to the waterside, and his horse neighed, and with much difficulty was brought to keep his course. They rode to Maldon, were wedded and bedded, and the Earl said, 'Seeing she had ventured her life for him, God bless her.'" Why has not some local poet embalmed this old-world tale in a ballad which should rival that of the "Fair Ellen of brave Lochinvar"?

After thanking Mr. Horwood for his kindness, the party was then taken by Mr. Fitch along the London Road to the site of the CAMP, which had been alluded to in his introductory remarks as almost certainly King Edward's "Burg wrought and getimbred" in A.D. 913 or 920. Short notices of this earthwork are contained in most of the topographical works relating to Essex, but the accounts appear to be invariably compiled from what Dr. Salmon wrote:—"There are the remains of a Camp on the west side of the town, through the middle of which the road to Chelmsford goes; three sides of the fortifications are visible; the ground within the vallum seems to be of about twenty-two acres. Just without it, on the north side, is a fine spring, which improved the situation. We see three sides of a square or oblong, the rest being built upon and defaced. This has a fair pretence to be Roman, but as Edward the Elder encamped here, it is not certain whether he fortified it or found it ready done to his hands. It is by no means unworthy Roman choice, and answers the distance of the Itinerary from Haverhill." The spring referred to by Salmon is the Cromwell Well, which still supplies the town with water. Mr. Fitch was able to add little to the above; the earthworks are now very indistinct, and it is much to be desired that some systematic examination of them should be made before they quite disappear. Two small sepia sketches of the Camp were exhibited, of unknown origin, but they were unfortunately too indefinite to merit reproduction in this report.

BEELEIGH ABBEY. *From a drawing by* H. A. COLE, *September*, 1888.

Passing along the pathway on the western rampart of the Camp, down Constitution Hill, and by a pleasant walk through the fields, the remains of BEELEIGH ABBEY were reached, and the visitors could not but note (to use the words of the Rev. Frederick Spurrell) the care and skill with which the founder of the Abbey had selected his site. At the bottom of a long slope from the very high ground of Maldon, and on the banks of the river Chelmer, it was not only sheltered from the sea breezes and bitter east winds, but had water in abundance, for use and as a means of carriage or escape from enemies. The Abbey was in mediæval times of considerable importance. It was of the Premonstratensian order or "White Canons,"[b] dedicated to St. Nicholas, and founded, according to Leland, by Robert de Mantell in 1180 by a migration from a monastry at Perundun, now the Manor of Canons, Great Parndon (in this county), thirty miles distant. The place is now used as a farmhouse, in the occupation of Mrs. Chapman, who received the party very kindly, and allowed a thorough examination to be made of the venerable building. From the outside it now presents a curious patchwork of boards, bricks and ancient stone-work, only the east front with its windows being in anything like fair preservation, but the inside retains many of the ancient features, and from the rooms now existing the visitor may gain some idea of the size and architectural characteristics of the old monastery. The Early English Refectory (*temp.* John) and rather later Chapter House (*temp.* Edward III.) which is tolerably entire, and a still remaining part of the monk's dormitories, were visited. The mantel-piece on the west side of the Refectory consists of some Tudor stone-work alleged to be the canopy of the tomb of Henry Bourchier, Earl of Eu, in Normandy, and Essex, Lord Treasurer of England, and his lady, Isabel, sister of Richard Plantagenet, Duke of York (father of Edward IV.), both of whom we know were buried in the Chapel of the Virgin Mary in this Abbey. The Rev. F. Spurrell, Rector of Faulkbourne, published in 1864 a very interesting pamphlet on the Abbey. This was shown by Mr. Fitch, who also exhibited a work on the subject by Mr. G. Draper (1818) containing beautifully coloured and plain plates of various details of the building; also etching of the east side ("Antiquarian Etching Club," vol. iii., pl. 12), and plate showing interior of chapel and numerous details, by Mr. D. P. Fordham, 1865 ("Architect," January 22nd, 1870). Mr. R. H. Eve had shown in the Town Hall a large oil painting of the Abbey, by R. Nightingale. Mr. Chapman exhibited a half groat of Henry III., and a silver penny of Edward III., which he had lately found in the rafters of the building.

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[b] These were a religious Order of Regular Canons or Monks, originally of Prémontré, instituted in 1120. They were called "White Canons" from their distinctive dress.

Mrs. and Mr. Chapman were cordially thanked for their courtesy, and the party returned to the railway bridge for the purpose of travelling as far as Hazeleigh, two miles along the new railway to Woodham and Southminster, then in course of construction. By the kindness of Mr. J. T. Middleton (of the firm of Messrs Walter Scott and Co., contractors for the new line) and under the careful direction of Mr. Forbes, the Foreman, a "special train" of three trucks had been fitted up with seats, and one also canopied over for the use of the ladies. The journey through the cuttings was thus rendered a pleasant one, although the jolting in some parts, where the line was only temporarily laid, was a sensation to be remembered.

The train was stopped at a point near the Spital Road Tunnel, where the cutting is 40 feet deep. Here Mr. T. V. Holmes pointed out, and made a few remarks upon, the sections exposed, the beds being gravel and loam of Glacial-Drift age, overlying the London Clay (See note by Mr. Holmes in the ESSEX NATURALIST, vol. i, 149, and a "Memoir of the Geological Survey," by Mr. W. Whitaker, F.R.S., now passing through the press). Mr. Holmes said, the geological members would notice that the beds capping the hills were in the main of a sandy and gravelly nature, while below them was solid clay, in which appeared here and there the calcareous concretions known as Septaria, which were very characteristic of the London Clay. The Glacial Drift of Essex, where more than one member of it was present, usually consisted of sandy and gravelly beds below and Boulder-clay above. It was impossible for them, on that occasion, to make out the details of the Drift on account of the quantity of soil and other material that had been washed down the sides of the cutting. But the one point of special interest there had been mentioned by Mr. Whitaker (ESSEX NATURALIST, i. 149), and consisted in the presence of a lower bed of Boulder-clay, between the London Clay and the gravel.

At a crossing near to Hazeleigh all alighted, and Mr. Fitch made a graceful acknowledgment of the great kindness received from Mr. Middleton, as in addition to the fittings, trucks, and engine, for the journey itself, much of the work along the portion of the line traversed had to be stopped during the progress of this "first passenger train," and he also thanked Mr. Forbes for his courtesy and willingness to oblige. The vote was seconded by Mr. T. V. Holmes and carried amid cheers. Mr. Forbes having replied, a movement was made towards the Moated Manor House of HAZELEIGH HALL, once the home of the Essex family of the Alleynes, one of whom, Edward Alleyne, the celebrated actor and "Master of the King's Bears," having retired from the stage in 1612, founded the "College of God's Gift" at Dulwich. This house, with the farm and woodland connected with it, is one of Mr. Fitch's holdings, and here the large party was most kindly received by Mrs. Fitch, who had driven over from Maldon, on hospitable thoughts intent, and under whose direction the tables in the quaint old building had been loaded with a most bountiful and refreshing afternoon tea, and refections of all kinds, for those who had travelled long distances to be present at the meeting.

Closely adjoining the Hall, there stands:—

"* * * * A little Church beside a wood,
Securely sheltered from the sweeping blast;
So quiet, so secure, it seems to be
A very type of rest and all that's still." [6]

It is the tiny church of St. Nicholas, built of timber and plaster, like the country-side cottages; so modest in appearance that it has been called "The meanest Church in Essex," and yet having a quaint simplicity that seems appropriate to its place beside what may have been an old Saxon homestead, once "held by Ailmar, a free man, in the time of King Edward," before the writing of the Domesday. There is a nave and chancel, and a small turret at the west end, with one poor bell. Inside—

"'Tis plain and simple—here no tracery
Stretches across the windows—no fair form
Of Saint, or Martyr or the Holy Cross,
Gleams in the sunlight,"

And almost the only noteworthy feature is the sixteenth century iron hourglass stand, fixed near the pulpit—a relic of the times when the preacher regulated his discourses by the passage of the sand through the glass, and perhaps drew many a moral, "fifthly and sixthly," from the sight of the falling grains slowly but relentlessly marking the flight of time.[7] Mr. Fitch exhibited the Registers, containing the arms of "Gyles Aleyne, gentileman," fully emblazoned; the records of burials dating from 1584; the weddings from 1589; and the christenings from 1590.

Before plunging into the wood, Prof. Boulger and Mr. Letchford asked the party to return their thanks to Mr. and Mrs. Fitch, and the heartiness with which the response was made denoted the company's due feelings of gratitude, and a lively sense of favours to come; for the pleasures of the meeting had only just commenced, and there was all the morrow to look forward to!

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[6] From "Recollections of Hazeleigh Church," in a small volume entitled "Poems by a Country Curate, H.R.W.," written by the Rev. H. R. Wadmore, who was curate here, 1848-1850. This poem was read by Mr. Fitch at the Church gate.

[7] So far as we know, there are only two other examples of these stands now existing in Churches in Essex—one in Ingatestone Church, and the other in that of South Ockenden. Both are figured in Buckler's "Churches of Essex."

We were fortunate in having with the party many good botanical members, and records of the plants observed were kept by Prof. Boulger, F.L.S., Mr. Fitch, Mr. E. M. Holmes, F.L.S., Mr. David Houston, F.L.S., Mr. J. C. Shenstone, F.R.M.S., Rev. Lancelot Sharpe, Mr. C. A. Wright, F.L.S., and others, and the compiler of this report very gladly acknowledges their valuable aid. The botanical work began in the Witham railway cutting, where *Calamintha nepeta*, which is perhaps the chief Calamint of N. Essex, was abundant, and it was also noted in plenty on Danbury Hill by the Secretary and Mr. H. C. Snell, when cycling down to Maldon to attend the meeting. At Beeleigh, among the many elm trees, whilst most, perhaps, were simply *Ulmus campestris latifolia*, were several specimens of that characteristically Essex form, *U. lævis* (Spach) *carpinifolia* (Lindl.) (*U.* "*elegans*," Forster MSS.) On the walls of the Abbey were *Sedum reflexum* and *Centranthus ruber*; and in the yard was the once-cultivated English Mercury, *Chenopodium bonus-henricus*. Hazeleigh was very interesting (as Prof. Boulger remarked) as practically an unworked district, there being but one record from it in Gibson's "Flora of Essex"; and, although the majority of plants found were naturally only common and generally distributed species, the lateness of the season enabled a considerable number to be got together, especially of woodland forms. Thus, no sooner had we alighted from the trucks than *Linaria spuria* was found, and, as we traversed the lane and fields leading to Hazeleigh Hall, the Corn Crowfoot (*Ranunculus arvensis*), with spinous achenes, the Meadow Vetchling (*Lathyrus pratensis*), *Euphorbia exigua*, and the probable escapes from cultivation, *Medicago sativa*, *Melilotus officinalis*, and *M. alba*, were noted in flower.

Near Hazeleigh Church a specimen of *Agaricus* (*Lepiota*) *procerus* was obtained; and on trunks, palings, and the soil in an old orchard, and in parts of the woodland hard by, Mr. E. M. Holmes and Mr. Houston gathered the following LICHENS and MOSSES, which were determined by Mr. Holmes:—

LICHENS.

Calicium hyperellum, Ach.
Evernia prunastri, L.
Parmelia olivacea, L.
P. borreri, Turn.
P. saxatilis, L.
P. aleurites, Ach. On palings.
P. perlata, L.
P. reticulata, Tayl. On trees.
P. caperata, L. On trees.
Physcia erosa, Borr. In orchard.
Ph. parietina, L. In orchard.
Ph. pulverulenta, Schreb.
Ph. tenella, Scop.
Lecanora varia, Ehrh.
Pertusaria faginea, L.
P. globifera, Turn.
Lecidea ostreata, Hffm. Off palings.
L. canescens, Dcks. *In fruit*; orchard.
L. parasema, Ach. In the orchard.
Verrucaria nigrescens, Pers.

Mr Holmes remarks that the neighbourhood of Maldon would probably repay a careful search by a lichenologist; the species enumerated being found during a somewhat hurried ramble. The occurrence of *Lecidea canescens* in fruit indicates that the condition of the atmosphere is suitable for the development of lichens.

The mosses enumerated by no means represent the number that might be easily collected, but consist only of those which were observed while looking for lichens, or which the peculiarity of the ground passed over suggested as likely to occur, and which were then found:—

MUSCI.

Pottia truncata, L.
Barbula lævipila, Brid.
Physcomitrella patens, Hedw.
Webera carnea, L.
Mnium undulatum, Hedw.
Atrichum undulatum, L.
Fissidcus taxifolius. L.
Leucodon sciuroides, L.
Thuidium tamariscinum, Hedw.
Eurhynchium myosuroides, L.
Eu. swartzia, Turn.
Hypnum cupressiforme, L.
H. purum, L.

These treasures having been duly "bagged," and the straggling botanists called together, as the shades of evening fell the ramble Maldon-ward led through Hazeleigh Hall Wood, a glorious spot for the naturalist, and one comparatively unworked. The birds frequenting the wood are numerous, among others the Green Woodpecker being especially abundant As stated above, the botany of the wood has hitherto been quite unnoted, but the Rev. G. H. Raynor's paper on the Macro-Lepidoptera of the district (see "Trans. Essex Field Club, vol. iii., pp. 30-47") has called attention to its entomological riches. One of the most interesting of the butterflies occurring is *Thecla w-album*, a very local species.

As recorded in the report of the December meeting, a few nights "sugaring" in the wood afterwards enabled us to add one or two species to Mr. Raynor's list, and Mr. Fitch's own researches have added eight species—these additions may be conveniently recorded here:—

ADDITIONS TO THE LIST OF THE MACRO-LEPIDOPTERA OF THE MALDON DISTRICT.

Hesperia comma, L. Rare; Danbury.
Arctia villica, L. Two specimens; Maldon Hall.
Asphalia (*Cymatophora*) *diluta*, Fb. Hazeleigh Wood. Common at "sugar."
Neuronia popularis, Fb. Common at light; Maldon.
Agrotis corticea, Hb. Abundant at Maldon.
A. tritici, L. Common at Maldon.
Anchocelis litura, L. At "sugar" in Hazeleigh Wood.
Odontopera bidentata, Clerck. Several; Hazeleigh Hall Wood, Maldon.
Acidalia emutaria, Hb. Not rare; Maldon, Northey Island.
Eucosmia certata, Hb. One specimen; Hazeleigh.

The trees in the wood include much maple (*Acer campestre*), spindle (*Euonymus europæus*), hawthorn, dogwood (*Cornus sanguinea*), guelder-rose (*Viburnum opulus*), elm, beech, oak, and hornbeam; not forgetting the abundance of hazel, the nuts just ripening, which pleasantly recalled the derivation of the name of the parish (Saxon, "Hazel Pasture.") The broom (*Sarothamnus scoparius*) suggested some small remnant of Glacial-sand or gravel; and the blackthorn, the abundant low-growing and seldom-flowering honeysuckle, some undetermined brambles, and the dewberry (*Rubus cæsius*), were among the most shrubby species. The curious Butcher's-broom (*Ruscus aculeatus*) was not uncommon in the upper part of the wood.

The marshy character of much of the ground was indicated by such plants as *Lychnis flos-cuculi*, *Spiræa ulmaria*, *Galium uliginosum*, *Pulicaria dysenterica*, *Gnaphalium uliginosum*, *Juncus bufonius*, and *Callitriche*; whilst among more ordinary sylvan species were *Viola-eu-canina*, *Lychnis diurna*, *Ajuga reptans*, *Glechoma hederacea*, *Lamium galeobdolon*, *Stellaria graminea*, *Hypericum humifusum*, *H. perforatum*, *H. hirsutum*, *H. tetrapterum*, and *H. dubium*; *Geranium* *dissectum*, *Lotus major*, *Vicia hirsuta*, *V. tetrasperma*, and *V. gracilis*; *Agrimonia eupatoria*, *Fragaria vesca*, *Geum urbanum*, the beautiful *Epilobium angustifolium macrocarpum*, to every appearance truly wild; *E. hirsutum*, *E. parviflorum*, and *E. roseum*; *Circæa lutetiana*, *Arctium majus*, *Centaurea nigra*, *Erythræa centaurium*, *Myosotis arvensis*, *Solanum dulcamara*, *Scrophularia nodosum*, *Melampyrum pratense*, *Veronica officinalis*, *Prunella vulgaris*, *Nepeta glechoma*, *Stachys betonica*, *Teucrium scorodonia*, *Mercurialis perennis*, *Tamus communis*, and *Endymion nutans* in fruit. The numerous clearings and paths facilitated the growth of some of these species, and of others less to be expected, such as the abundant *Lepidium campestre*, *Lychnis vespertina*, *Malva sylvestris*, *Daucus carota*, *Lapsana communis*, *Helminthia echioides*, *Linaria elatine*, *Odontites rubra*, and *Anagallis arvensis*; other species found were *Conium maculatum*, abundant *Dipsacus sylvestris*, rejoicing in the stiff clay, and *Heracleum spondylium*; whilst among the most interesting were the white form of *Erythræa centaurium*, plentiful, and the local *Melampyrum cristatum* (not recorded by Gibson for this district; he states that "this showy but local plant quite takes the place of the commoner *M. pratense* in the N.W. of Essex, especially near Walden.") *Linaria elatine* is a trouble to the farmer in the neighbouring fields; Mr. Fitch told us that two fields of wheat had been hoed twice that year, at a cost of seven shillings per acre, entirely on account of the extraordinary abundance of the plant, almost the only weed in the fields. It was curious to note violets, primroses, and wood anemones in bloom in the wood, in company with the autumnal flowers.

A few species of Hepaticæ were noted, such as *Jungermania bidentata*, *Frullania dilitata*, and *Pellia calycina*. From a cursory inspection of the locality, Mr. Holmes thought that it would prove, if well searched, to be rich in Fungi; the species gathered were *Agaricus* (*Amanita*) *rubescens*, Fr.; *A. phalloides*, Fr.; *Lactarius vellereus*, Fr.; *Cantharellus cibarius*, Fr.; *Polyporus lucidus*, Fr.; *P. versicola*, Fr.; *P. vaporarius*, Fr.; *Craterellus cornucopioides*, Fr.; *Clavaria vermiculata*, Scop.; *C. cristata*, Holmsk.; *Nectria cinnabarina*, Fr.; and *Xylaria hypoxylon*, Grev. (the "Candle-snuft Fungus"), common on stumps, with many others that escaped record at the time.

Quitting the wood, the route led to the manor-house of "Jenkyns," another of Mr. Fitch's holdings, which was inspected. Here was seen a Roman (?) coffin, of shell-limestone, found on the farm in the field adjoining the wood (several others were left *in situ*), in April, 1838[6] And then, after a long, busy, merry walk, Maldon was reached, and the company did ample justice to the excellent tea provided at the "King's Head" Hotel.

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[6] In the "Chelmsford Chronicle," quoted in the "Gentleman's Magazine" for 1838, the discovery is thus noted:—"On the 2nd April some labourers, whilst land-ditching in the middle of a field of 25 acres, upon Jenkin's farm, in the parish of Hazeleigh, and in the occupation of Mr. Hart, of Woodham Mortimer Hall, discovered a stone coffin about four feet from the surface. Impressed with the notion that it contained hidden treasure, they hastened to satisfy their curiosity by breaking the lid, but to their mortification it was found to contain the remains of a human body, which had in all probability been interred in it centuries ago. Mr. Hart subsequently examined it, and found the skull and other parts of the skeleton; the coffin or box was four inches thick, and about six feet nine inches long." The recorder in the "Gentleman's Magazine" ("J. A. R"), adds:—"I was informed that the lid of the coffin was two feet below the surface of the earth. The coffin was placed east and west, containing a female skeleton. I have examined the stone coffin, which is of shell-limestone, but the bones, etc., have disappeared. and no urns, but some small fragments, were found outside, which, from their forms, are undoubtedly Roman. I send you a section of the coffin, showing the shape of the lid" In the same place is recorded the finding of a stone coffin in "Stoney Hill Fields," upon Woolshots Farm, in the parish of Ramsden Bellhouse, which was similar to the other, but without a lid, appearing to have been arched over with flints—it contained a skull and other bones.

After tea a meeting was held in DR. PLUME'S LIBRARY, by the permission of the librarian, the Rev. E. R. Horwood, M.A., vicar of Maldon, who most kindly gave every assistance in his power. The entrance to the Library is through the tower of St, Peter's Church; the Church went to decay and fell down about 1665, when Rev. Thomas Plume, D.D., Archdeacon of Rochester, and founder of the Plumian Professorship of Astronomy at Cambridge, built on its site a Free School and Library, and at his death bequeathed a fund for its support and for the purchase of new books. Dr. Plume was born in Maldon, and baptised in All Saints' Church 18th August, 1630; he was educated at Chelmsford School, and at Christ's College, Cambridge; he died in November, 1704, and was buried in Longfield Churchyard, Kent. He was a munificent benefactor to his native town. His library consisted of about 5,000 volumes, mostly of a theological character, and some of the editions are rather rare and valuable. For instance:—De Lira's Commentary, 3 vols., 1487, the oldest printed book in the library; the Complutensian edition of the Bible in 9 folio volumes, Paris, 1645, beautifully illustrated; Purchas's Pilgrims, 4 vols., 1625; Skelton's Poems, 1568; Newcourt's Repertorium; Morant's Essex, 1768; Processionale ad usum Eccl. Sarum, 1553; Weever's Funeral Monuments, 1631; Gower, De Confessione Amantis, black letter in old vellum, in fine condition, 1554; Milton's Paradise Lost, 1667; Legenda Sanctorium, 1517; Waltoni Polyglotta, 1657, etc., etc. There are also some 200 volumes of books procured during the time Mr. Horwood has held office, among which are Dugdale's Monasticon, 8 vols. folio; Hasted's History of Kent; Lipscombe's History of Buckinghamshire; and many standard works of history, biography, etc.

The tables in the Library were covered with objects of antiquity and natural history, principally of a local nature, kindly contributed by members and friends. The largest and most important exhibit was a complete collection of the objects found during the excavations carried on by the late Mr. J. Oxley Parker at the site of Othona at St. Peter's-on-the-Wall, Bradwell-juxta-Mare. The collection had been catalogued by the Rev. R. P. Coates and Mr. C. Roach Smith, and was kindly lent for exhibition by Mrs. Oxley Parker. The objects included a series of the coins of 24 Roman Emperors, from Gallienus (A.D. 260), to Honorius (A.D. 395), with many Saxon sceattæ, and coins of the King of Mercia, Athelwolf, Charles I., James II., Elizabeth, etc.; spindle-whorls, fibulæ (Roman and Saxon), Roman tooth-combs, styli, keys, bone implements, knives, lance-heads, spear-heads, tweezers, armillæ, beads, needles, pins, glass vessels, pottery, etc., etc., in great variety; and the set of specimens is one of the most valuable and interesting ever obtained from any one locality in Essex. [*For some account of Othona see below.*]

A collection of fragments of pottery and glass, and one entire vase, obtained from the railway excavations near Heybridge, were exhibited by Mr. J. W. Hawkes, who also showed some old seals. Mr. Forbes also exhibited pottery, etc., from the railway cutting, including a very fine vase, which Dr. Laver said was the smallest specimen he had ever seen. The President had a large collection of pottery, coins, etc., from the same locality on view.

Mr. J. Wade sent some pottery and coins found in the neighbourhood. Mr. R. H. Eve exhibited a salmon-trout, caught by J. White in a net in Beeleigh Floodgate hole, January 4th, 1870 (length 27 inches, weight 7 lbs.); also an otter killed at Heybridge Bridge, and a water colour sketch of the Old Bridge, Heybridge, by R. Nightingale. Mr. E. Hance a case of insects, which were stated to have been collected by his sister near Maldon more than 40 years ago;

among the specimens were nine species of Sphingidæ (including *Acherontia atropos* and *Sphinx convolvuli*), *Vanessa antiopa*, and two specimens of *Papilio machaon*, which were said to have been taken at Tillingham; also a case containing two Ospreys (*Pandion haliaëtus*), shot near Maldon by Mr. Richard Bygrave. The Rev. E. R. Horwood had placed on tables some of the most interesting books from the library, referred to above, and also exhibited a portrait of Ray, the great Essex naturalist, and a large oil-painting of Mrs. Oakeley, of Launton, Oxfordshire, Ray's mother-in-law. Mr. Holmes, Prof. Boulger, Mr. Houston, Mr. Shenstone, Mr. Wright, and others, exhibited the botanical specimens collected during the afternoon, duly arranged and named, and several other exhibits were made, of which the reporter has no record, and others are referred to in the proceedings of the meeting.

The Mayor took the chair at an ORDINARY MEETING of the Club (the ninety-third).

The following were elected members:—Mr. J. Barley, Mrs. Barley, Mr. W. Beasley, Mrs. Beasley, Messrs. R. Joslin, Champion B. Russell, J.P., Captain C. T. Thompson, and Miss Rose Willmott.

Dr. Laver exhibited flint implements from Walton-on-Naze and Lexden, described in his paper in the ESSEX NATURALIST (*ante* page 127), and made some remarks upon their character and place of occurrence.

Mr. Andrew Johnston called attention to the curious parallel trenches, containing ancient remains, which had been discovered near Shoeburyness, which he thought would be well worthy the attention of the Club.[9]

Prof. Boulger gave a report on the plants observed during the afternoon, most of which have been already referred to above. He called attention to the cleistogamous flowers of the dog-violet found in Hazeleigh Wood.

Mr. E. M. Holmes made some remarks upon some fasciated branches of *Suæda fruticosa*, found by Messrs. Fitch and Cole on Osey Island the day previous, and also upon a specimen of the Wild Asparagus (*Asparagus officinalis*), found in the same place, growing 4 to 5 feet high, near the limit of high water, and of more than usually flexuous habits. He also referred to the Lichens found at Hazeleigh, and said he was sure that the locality would well repay a thorough search; the explorer would probably find many species new to the county, and not recorded in the Rev. J. M. Crombie's paper in the Trans. Essex Field Club (vol. iv. pp. 54—75).

Mr. Howard Vaughan exhibited, on behalf of Mr. John Mason, of Wandsworth, a fresh branch of the red double-flowered Hawthorn. Until July last the tree had shown no signs of foliage, and was believed to be dead. Leaf-buds then appeared, and in September it burst into bloom. It should be mentioned that the tree had been moved in the garden during two successive autumns.

The President remarked that the times were out of joint; they had seen wood-anemones, primroses, violets, etc., in bloom in the woods, and a specimen of the brimstone-moth (*Rumia cratægata*) had been noticed.

Mr. B. G. Cole exhibited three caterpillars of *Deilephila galii*, taken the preceding day from the *Galium verum* on Osey Island (see *ante* page 188).

The President and Dr. Laver explained the interest attaching to many of the objects exhibited, especially the valuable relics from Othona, and the pottery found in the railway excavations at Heybridge. The fragments at the latter place were in immense quantities, and a few unbroken vessels had been found, with bones of animals, etc., all imbedded in black earth, found in pits in the gravel 3 or 4 feet deep. A more detailed account would be published in the ESSEX NATURALIST. (See also Mr. Fitch's address, *ante*). They were of great interest, as giving undoubted evidence of the Roman occupation of Maldon. Dr. Laver described the different kinds of Roman pottery, and said that modern potters had found it quite impossible to imitate the glaze and colour of the old Samian ware, of which many examples were shown.

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[9] We are glad to say that these remains are being investigated by Mrs. Chenevix Trench, and we hope to publish her notes in the ESSEX NATURALIST.—ED.

Owing to want of time, Mr. Fitch was able only to give a summary of a paper he had prepared on "The Ancient Customs and Worthies of Maldon." He mentioned the custom of Borough-English already referred to, and the first place among those worthy to be remembered in connection with the town was allotted to DR. THOMAS PLUME, the founder of the library in which the party was assembled, and a short sketch of whom has already been given. SIR JOHN BRAMSTON, Lord Chief Justice of England, and the most celebrated lawyer of his time, was born in Maldon in 1576, his father being a descendant of William Bramston, who was Sheriff of London in the reign of Richard II., and his mother the daughter of Francis Clovill, of an ancient family then residing at West Hanningfield Hall, Essex. Sir John presided over the judges who gave the celebrated judgment against Hampden on the question of "Ship-money." He bought the manor of Skreens at Roxwell in 1635, the year he was made Lord Chief Justice; he died in 1654, and was buried in Roxwell Church, where on a marble stone in the chancel there is a long Latin inscription to his memory from the pen of the poet Cowley. JOHN ROGERS HERBERT, R.A., was born on January 23rd, 1810, at Maldon, where his father was comptroller of customs. He was a student in the Royal Academy, but the death of his father obliged him to abandon study and direct his attention to portraiture, in which he soon attained eminence, and one of his sitters was the Queen, then Princess Victoria. He was elected R.A. in 1846, and in 1848 was invited to assist in decorating the new Houses of Parliament.

Certain traditions in the town connect SIR EDWIN LANDSEER with it, even asserting that he was born there, and the Mayor humorously said that out of a dozen biographers whose works he had consulted, half said that this was the case, three credited London with the birth of the great painter, and three did not say that he was born anywhere! Private enquiry led him to believe that Sir Edwin was not a native of Maldon, although he spent a great deal of time at his (the Mayor's) present house, and was often at Beeleigh Grange. Mr. Miller Christy sent for exhibition a picture reputed to be by Landseer, accompanied with the following details, which are perhaps of sufficient interest to be given entire:—

NOTE ON SIR EDWIN LANDSEER.

I find on referring to the chief biographical works which have been published relating to Landseer, that in very early life he must have had some connection with Maldon and Chelmsford, though I can discover nothing to show what that connection was—whether birth, schooling, or otherwise. Probably, if he was not born in the district, his family had friends or relatives residing here, whom he used to visit.

Thus his two first exhibited works were local. They were shown at the Royal Academy in 1815, when he was only thirteen (having been born in 1802), and were entitled respectively "Portrait of a Mule, the property of W. H. Simpson, Esq., of Beleigh Grange, Essex," and "Heads of a Pointer Bitch and Puppies, the property of W. H. Simpson, Esq., of Beleigh Grange, Essex." About the same time he painted "A French Hog, the property of Mr. Bacon of the Black Boy Inn, near Chelmsford."

Even before this time, however, he had drawn something of local interest, but to this, I believe, attention has never before been called, although I feel confident it will be found to be *the earliest of Landseer's published works*—of course, excepting those early works of his which have been published since his death. In the appendix to the Rev. W. B. Daniels' well-known work on "Rural Sports" (p. 481) may be seen an engraved plate of the head and tail of a fine long-haired cat, "the property of Mrs. Finch of Maldon." It is inscribed as follows:—"T. Landseer filius. sculp. from a drawing by his brother Edwin," and as it is dated September 1813, it follows that it was done when Edwin was only *eleven years old*.

Many early sketches done by Edwin Landseer when a child were published some seven or eight years ago in the "Art Journal," some of which may have been of local interest, but I have not copies to exhibit.

We have here (at Chignal St. James) a reputed Landseer about which an interesting tale is told. About forty years ago my late father on taking a house in Chelmsford High Street became possessed of one of two old pictures, the other of which pair has now been lost sight of. It was said at the time that this picture was either wholly or in part the work of Edwin Landseer—that he had in early days lived and studied at Chelmsford (this would have been about thirty-five years before; *i.e.*, about 1815); and that he had then been either a pupil of or intimate with a local artist who had had his studio in the house in Chelmsford High Street, where the picture was obtained by my father. It was further said that Landseer had been accustomed to paint the animals in his master's pictures, and that he either painted in the dog in the picture in question or painted the picture wholly himself in his spare time, in his master's studio, with his master's colours. This tale I heard from my father as long back as I can remember, and I give it simply for what it is worth. I have not as yet made any enquiries with a view to testing its authenticity, and it may either be true wholly or in part, or it may not. The tale appears not unlikely to be true. In the first place it is clear that Landseer in early life had some connection with the neighbourhood of Chelmsford and Maldon, while the fact that the painting was ascribed to Landseer as much as forty years ago (which was before he had attained to the great popularity he afterwards enjoyed), lends still further probability to the story.

The picture itself is painted on millboard, and measures about twenty-four inches by eighteen. Unfortunately, it is in a very bad condition, being much faded by age and dirt, and is, I fear, now past repair. It represents an aged woodman sitting upon a bank in a wood, engaged in eating his mid-day meal, while his dog, to which he is offering a piece of bread, has its paws upon his knee. This dog, a rough-haired terrier, is supposed to be Landseer's contribution to the design.

Among the *great* men of Maldon, Mr. Fitch said, must not be forgotten EDWARD BRIGHT, a shopkeeper of the town, concerning whom there is an account in the "Philosophical Transactions" (vol. xvii.). His size and weight were almost unparalleled. At the age of 12½ years he weighed 144 lbs.; in seven years more he weighed 336 lbs. The last time he was weighed, which was about thirteen months before he died, his weight was 584 lbs.; at the time of his death his weight is supposed to have been 616 lbs. He measured 5 ft. 9½ in. in height. His body, round the chest, was 5 ft. 6 in., and round the belly 6 ft. 11 in.; his arm in the middle measured 2 ft. 2in., and his leg 2 ft. 8in. Till a year or two before his death he was comparatively an active man; but afterwards his extreme corpulency so overpowered his strength that life seemed burdensome. His coffin was so enormously large that an opening was obliged to be cut in the wall and staircase to let him down into the shop, and it was carried to the grave upon a carriage. He died 10th of November, 1750, aged 29 years. Mr. G. E. Crick showed a post-horn, mounted in silver, and engraved "Maldon Post-horn,' which was used by Bright when a post-boy, before he developed his extraordinary adiposity. Mr. Walter Crouch exhibited a large folio mezzotint engraved portrait of Bright, and also a folio engraving entitled "The Surprising Bett Decided." This recorded a wager between a Mr. Codd and a Mr. Hance, and was decided when, on the 1st day of December, 1750, "in the house of the Widowe Day, the Black Bull in Maldon, aforesaid, seven men were actually with great ease button'd within the waistcoat of Mr. Bright, deceas'd, late shopkeeper of the same town." "If," said the Mayor, "the members did not believe the evidence of the old print, why, here is the identical waistcoat"; and amid much laughter he produced a garment of faded green baize of enormous size—sufficiently large to enclose any seven persons present—with arm-holes, at a rough guess, about 1½ feet in diameter.[10]

Owing to the exigencies of the *tide*, for the water excursion on the morrow it was necessary with most of the party to act upon the primary monition of the proverb—"early to bed"—in order that the second—"early to rise"—might be followed, for on

SATURDAY, SEPTEMBER 15TH,

"Come all ye learned Botanists and hearken to my tale,
And list ye Entomologists, nor let your courage fail;
Come all ye Archæologists, who doat on Samian ware,
Or by the Neolithic flint and 'scraper' loudly sware;
Come all ye Ornithologists, and ye who dig for bones,
And read the story of the earth from records writ on stones;
Come with your nets and microscopes, the while I sing to you,
The Song of Maldon and the 'Rose,' and what befell her crew."

F. C. GOULD—"The New Song of Maldon."

The company assembled before eight o'clock at the "Hythe," on the banks of the Blackwater at the lower part of the town, hard by ST. MARY'S CHURCH. A few minutes were allowed for the inspection of this ancient (but recently "restored"[11]) building, which is said to have been founded by Ingelricus (a Saxon nobleman), and Edward his brother, and given by them as an endowment of St. Martin's-le-Grand, London, in 1056, a grant confirmed by William the Conqueror in 1068. During the restoration the rood staircase was disclosed, also three niches on the north wall, and a small lancet window in the tower. The tower, with its massive flying buttresses and western doorway (*temp.* Edward III.), is well worthy of attention; the tower was anciently a sea-mark, and the hexagonal lanthorn of the Beacon still remains. The upper part of the tower fell down in 1628, and was rebuilt in Tudor red-brick, a royal brief for subscriptions having been granted by Charles I. The lower part is Norman, with many Roman tiles built into the fabric. The church forms the central object in the view of the town, given on a former page.

Some interest was shown in Mr. A. J. Furbank's exhibition of a living specimen of the "Death's-head moth," which he had found in the High Street, and which repeatedly gave evidence of possession of power to emit a "squeak," not commonly attributed to the moth tribes (see *ante* page 188).

At this early hour the prospects of a fine day were dubious, a thick fog obscuring the distant reaches of the river and the low marsh-land around. But cheerless as the outlook seemed, the large party of about seventy ladies and gentlemen (augmented considerably by a shelf of "Odd Volumes" from Chelmsford, and members and friends from Colchester and other parts of Essex) embarked punctually on board the barge "ROSE" (Captain Thompson), very generously chartered for the occasion by the Mayor; and once on board, the spirits of the company rose to a high degree of pleasurable excitement. A long table, reaching from end to end of the spacious hold, with huge hampers grouped around, suggested welcome provision for sharpened appetites. Maps and charts, and a good selection of works on marine zoology, with dredges, nets, aquaria, pill-boxes, and glass tubes, gave evidence that some of the party, at least, intended to make use of the opportunity afforded for gaining an acquaintance with the zoological and botanical treasures of the estuary; but it was not until breakfast had been disposed of that real work began. It had been purposed to sail 20 miles down the estuary to Colne Point, St. Osyth, and visit on the return journey Osey Island and Stansgate Abbey, and possibly Bradwell Chapel; but one element proved faithless, and the wind dying away, the "Rose" was left as stationary as a water-lily off the Mersea shore for some hours:—

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[10] The descendants of the parties to this curious wager are now living in Maldon, viz., the great-great-grandson of Bright, and the grandsons of Codd and Hance—all in good positions.

[11] "Restoration means desecration, and a monument 'restored' is a monument destroyed."—The late REV. THOMAS HUGO, M.A., F.S.A.

"With swelling sails, past misty shores, the stately vessel glides,
Cleaving the shoals of jelly-fish that float around her sides;
Past muddy flats with sea-wrack clothed, the meadows of the sea,
And Osey Isle with sea-blite crowned, that lies upon the lee;
Past rippling shoals where herons stalk, with downward slanting beaks
Startling the wild duck from their haunts amid the oozy creeks,
Still onward on an even keel the good ship 'Rose' sails down,
Till far behind are left the towers of ancient Maldon town.

* * * * * * * * * *

To starboard, on the Bradwell shore, an ancient chapel lay,
Near where Othona's ruined walls are buried in the clay,
Whilst on the port side Mersea Isle displayed a square church tower,
And to and fro' the vessel swam for many a weary hour;
'Twixt Mersea Isle and Bradwell shore she drifted like a log,
Although the sun shone out and cleared away the misty fog;
No breath of wind there came to stir the mirror-surfaced stream,
Like Vanderdecken's ghostly ship, she floated in a dream."[12]

Fortunately the "Rose" was furnished with boats, and Mr. Fitch had also engaged the yacht "Matilda" (Mr. Sargeant being skipper), so that many members of the party were enabled to move about, and dredging and trawling were industriously practised, both on board the "Rose" and the "Matilda," permission to do so having been very kindly given by Mr. John Smith, manager of the "Blackwater Fish and Oyster Breeding Company." Mr. E. M. Holmes, F.L.S., Mr. Walter Crouch, F.L.S., Mr. David Houston, F.L.S., and Mr. Fitch, engaged to identify the specimens found, Dr. Murie, whose name was on the programme, being detained in Scotland. The estuary is a capital hunting-ground for the naturalist, and the little the members were able to do, in the short time available, showed how rich a locality it would prove to be if carefully worked. Whales, seals, and many rare fishes, including salmon, are occasionally observed; eagles and ospreys are sometimes seen; herons and many kinds of wild-fowl are common, and the oysters of the Blackwater are famous far and near. On Osey Island the raven and many interesting birds, such as the sheldrake (*Tadorna cornuta*), nest every year, and until very recently the lesser tern (*Sterna minuta*) had a nesting colony on the shingley beach at the east end of the island, and probably the avocet (*Recurvirostra avocetta*) *used* to build there, as on Northey Island in the days of Dale.[13]

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[12] From the "New Song of Maldon." We understand that Mr. Gould will print this clever parody, so that all who were present at the meeting may obtain a copy.—ED.

[13] A day or two before the meeting Mr. Fitch went down the river with an eel-trawler, for the purpose of collecting specimens to exhibit in the aquarium at the meeting; in addition to the

Certainly the most generally observed zoological fact of the day was the extraordinary abundance of "Acalephæ," or "jelly-fish," whose life-histories are so marvellous. The sea was quite "soupy" with the common *Medusa aurita*, Linn.; in fact, while we lay becalmed off Bradwell and Mersea the water seemed to be animated by the regular and rhythmical pulsations of these translucent discs, slowly floating by us in incredible numbers. Every now and then a larger and more opaque species was noticed; this was the *Cyanæa capillata*, formidable, not in its appearance, but from the presence of numerous poison-threads, causing a sharp stinging or burning sensation when they are touched, as Mr. Fitch could fully testify when he captured a specimen from the boat with his hand. This species is locally known as the "stinging swalder," and is only seen in hot weather, on sunny days. In catching the common species with a bucket, several specimens of the beautiful little sea-acorn (*Cydippe pomiformis*) were brought on board; from its glassy, transparent nature, it was quite invisible in the water, but upon examination in a tumbler its iridescent, melon-like form, with the two long and delicate tentacles, was plainly observable.

Several species of Echinoderms were obtained; among them was one specimen of the rare Eyed-Cribella (*Cribella sanguinolenta*, Müller); it was bright orange-red in colour, and measured five inches across. The handsome common sun-stars (*Solaster papposa*, Linn.), locally known as "roses," were common, and varied much in size, as also was the Common Brittle-star (*Ophioglypha ciliata*, Müller), variable and beautiful as usual, with its slender ciliated vermiform and exceedingly brittle rays—veritable serpent-tails. Another Brittle-star was collected, but it remains unnamed. The Common Star-fish (*Uraster rubens*, Linn.), locally known as "five-fingers," was abundant, as might be expected when Mr. Fitch told us that last year he bought nearly 70 tons, at 16s. per ton, for manures all caught in the Blackwater. A few specimens of the Common Sea-urchin, (*Echinus sphæra*, Müller, and *E. miliaris*, Leske) were dredged. Holothurians were abundant, but received but little attention; nor did the Zoophytes, though Sertulariadæ were abundant; but the only Sea-anemone found was the common *Actinia mesembryanthemum*, L.

Of Stalk-eyed Crustacea, *Carcinus mænas*, Leach, was, of course, abundant, and a few specimens of *Hyas araneus*, Leach, were dredged up, with a species of *Portunus*, and one specimen of the remarkably slender and long-legged *Stenorhynchus longirostris*, Fabr. (*tenuirostris*, Leach). Whelk shells were commonly tenanted by the Hermit crab (*Pagurus bernhardus*, Linn.), locally known as "farmers."

The mollusca obtained by dredging, and also by searching on the shores of Osey Island, were catalogued by Mr. Walter Crouch, and a few species added by Mr. E. M. Holmes. Some of the species were represented by dead shells only.

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usual marketable fish, as eels, soles, plaice, flounders, dabs, etc., the following species were collected:—A Father-Lasher, locally "Bull-rout" (*Cottus bubalis*, Euphr.), measuring 9 inches in length, allowed by Arthur Wright, the fisherman, to be the largest he had ever seen. Last year Mr. Fitch recorded one 8 inches long (E. N. i. 114), but Day ("Fishes of Great Britain and Ireland," i. 53) says "it attains to 12 or 13 inches in length," a size which must be very exceptional for this common fish. Two specimens of the Armed Bullhead or Pogge (*Agonus cataphractus*, L.), one measuring 5 inches in length, the other 5½ inches. One Double-spotted Goby (*Gobius ruthensparri*, Euphr.), 2½ inches long. Several Butterfish or Spotted Gunnel (*Centronotus gunnellus*, L.); one measured 4¾ inches, another 5½. The Viviparous Blenny, locally "Eel-pout" (*Zoarces viviparus*, L.), was very common: the largest specimen measured 8½ inches in length. The Fifteen-spined Stickleback (*Gasterosteus spinachia*, L.) was common, and uniformly from 3 to 4 inches long. The Three-bearded Rockling (*Motella tricirrata*, Gmel.) was as common as the Five-bearded Rockling (*Motella mustela*, L.), which is not apparently general. These dull orange fishes are locally known as "Newcome" or "Lucome." The Great Pipe-fish (*Syngnathus acus*, L.), especially the young green specimens, many being very bright in colour, was abundant. The young mostly ran from 6 to 8 inches long, but the largest measured 16 inches, the maximum, according to Day (but cf. E. N. i. 114).

MOLLUSCA DREDGED OR TAKEN IN THE BLACKWATER ESTUARY.

LAMELLIBRANCHIATA :—

Anomia ephippium, L.
Ostrea edulis, L. (Oyster). Abundant.
Pecten varius, L. (Small Scallop).
Mytilus edulis, L. (Mussel). Abundant.
M. barbatus, L.
Modiolaria marmorata, Forb. Common.
Nucula nucleus, L. Several specimens.
N. nitida, G. B. Sow. Several specimens.
Cardium echinatum, L. (Spined Cockle).
C. exiguum, Gm. Common.
C. edule, L. (Common Cockle.) Common.
Tapes pullastra, Mont. Abundant.
T. virgineus, L. 1 specimen.
T. aureus, Gm. Common.
Tellina balthica, L.
T. tenuis, Da C.
Donax vittatus, Da C.
Mactra solida, L.
M. subtruncata, Da C. Common.
Scrobicularia piperata, Gm. Very abundant.
Thracia papyracea, Poli.
Mya arenaria, L. (Gaper Shell). Very common, Osey Island.
M. truncata, L. (Gaper Shell). Common.
Pholas candida, L. (Rockborer). Not common.

GASTROPODA :—

Chiton cinereus, L. (Coat-of-mail shell). Common.
C. fascicularis, L.
Patella vulgata, L.
Trochus cinerarius, L. Abundant.
T. magus, L.
T. umbilicatus, Mont.
Littorina obtusata, L. (Periwinkle). Common.
L. rudis, Maton. (Periwinkle). Very common on Osey Island.
L. littorea, L. (Common Periwinkle). Very common on Osey Island.
Rissoa membranacea, Ad. Common.
Hydrobia ulvæ, Penn. Abundant, Osey Island.
Odostomia lactea, L. (*Chemnitzia elegantissima*). 3 specimens.
Velutina lævigata, Penn. 2 specimens.
Purpura lapillus, L. Common.
Buccinum undatum, L. (Whelk). Common.
Murex erinaceus, L.
Nassa reticulata, Lmk. (Dog Whelk).
N. incrassata, Str.
Pleurotoma (*Mangelia*) *rufa*, Mont.
Utriculus obtusus, Mont. 1 specimen.
Acera bullata, Müll. Osey Island.
Melampas myosotis, Drap.

Mr. E. M. Holmes reports that "the Blackwater, so far as we explored it, seems to be remarkably poor in Marine Algæ. The list appended includes all that I was able to find, and these were mostly dredged up. The occurrence of *Fucus nodosus* var. *scorpioides*, J. Ag., has not been previously recorded in Great Britain, so far as I know. It is a very remarkable form, growing in dense patches on soft mud on Osey Island, in company with *Fucus vesiculosus* var. *subecostatus*, and a spirally twisted var. of *F. vesiculosus*. The occurrence of the *F. nodosus* var. *scorpioides* is the more remarkable that not a single specimen of the typical form of the plant was met with. The frond is not larger than that of *Gravilaria confervoides*, and were it not for its yellowish-brown or olive colour, and the short, opposite, patent ramuli here and there, might easily be mistaken for it. The fronds, also, are nearly cylindrical, instead of compressed, as in the type of the species. It was growing in tufts about 3 inches high, and 6 to 9 inches in circumference."

MARINE ALGÆ IN THE BLACKWATER ESTUARY.

MELANOPHYCEÆ :—

Fucus vesiculosus, L.
  f. spiralis.
  f. subecostatus, Harv.
F. ceranoides, L.

MELANOPHYCEÆ *(continued)*:—

F. nodosus, L.
  var. *scorpioides*, J. Ag.
Laminaria saccharina, Lamour.

MARINE ALGÆ IN THE BLACKWATER ESTUARY (continued):—

RHODOPHYCEÆ:—

Bostrychia scorpioides, J. Ag.
Polysiphonia elongata, Harv.
Chondria dasyphylla, Ag.
Laurencia hybrida, Lenorm.
Melobesia membranacea, Lamour. On *Zostera* leaves.
Lithophyllum lenormandi, Rosan. On pebbles.
Corallina officinalis, L.
Polyides rotundus, Grev.
Catenella opuntia, Grev.
Gravilaria confervoides, Grev.
Chondrus crispus, Stackl.
Duncontia filiformis, Grev.

RHODOPHYCEÆ (*continued*):—

Hildenbrandtia rubra, Harv.
Perponella dubyi, Cr.

CHLOROPHYCEÆ:—

Ulva lactnea, Le Jal.
Enteromorpha intestinalis, Link.

CYANOPHYCEÆ:—

Cladophora lætevirens, Harv.
Calothrix pulvinata, Ag. On stakes near the shore, Osey Island.
Isatis plana, Thun. On old oyster shells.

SEARCHING FOR *Deilephila galii*, OSEY ISLAND. *From a drawing by* H. A. COLE.

As stated, on previous and subsequent days some members of the party were enabled to land on OSEY ISLAND, and explore it in search of specimens. Some of the shells, seaweeds, etc., enumerated were thus obtained. A few species of the land mollusca were collected, the most notable being some fine specimens of the brightly-coloured hedge snail, *Helix nemoralis*, and a few *Helix caperata*, var. *ornata*.

While searching for shells on the mud and beach of the island, the following Annelids were noticed. Several species of *Sabella* and *Serpula* and *Spirorbis communis*, adhering to seaweeds; *Nephthys margaritacea*, and probably more than one species of *Nereis*, were common under stones, and were conspicuous by their activity. The casts of the common log or lug-worm (*Arenicola piscatorum*) so dear as bait to the sea fisherman, were noticed abundantly in the mud, but none of the worms were dug out. As bait, Mr. Fitch told us, their local price is generally half-a-crown per quart. Dead tubes of *Terebella conchilega* were not uncommon, and were eagerly examined by the conchologists for small shells, with satisfactory results. This tube-building worm is popularly known as the "Shell-binder." Upon the beach were likewise found dead specimens of the bristly *Aphrodite aculeata*, and portions of cuttle-bone (*Sepia officinalis*); the sponge-like egg-clusters of the common whelk were not uncommon, and the sessile barnacle or Acorn-shell (*Balanus balanoides*) was abundant on nearly every stone. The quantities of dead oyster-shells were observed in most instances to be completely riddled by the soft boring sponge (*Cliona celata*). In pools in the saltings and mud the little Crustacean (*Palæmon serratus*) was common, with "Sand-hoppers" (*Talitrus locusta*), and "Shore-jumpers" (*Orchestia littorea*).

The occurrence of the larvæ of *Deilephila galii* has already been noticed, but the general entomology of the island must be left for another opportunity.

The flora of Osey Island may be described as particularly interesting for so small a place. Besides a large number of plants more or less common to all coasts, such as species of *Atriplex*, *Suæda maritima*, etc., the following plants of special interest were found by the botanists of the party, Mr. E. M. Holmes and Mr. J. C. Shenstone:—*Silene maritima*, With. ("Sea-campion" can scarcely be termed a rare plant, nevertheless it is not so common but that its discovery upon the island is worthy of record); *Inula crithmoides*, L. (although usually by no means a common plant, it was found in comparative abundance); *Statice bahusiensis*, Fries. (found in abundance, and as the plant has not been recently recorded for this part of the coast, the "find" was a very interesting one); *S. dodartii* (also a very interesting discovery); *Suæda fruticosa*, Forsk. (the "Shrubby Sea-blite" is a far from common plant, but was found in abundance—several fine "fasciated" specimens were also gathered). *Asparagus officinalis*, L. (two forms of this plant are found in Britain; one prostrate, said to be the only truly wild asparagus, the other erect, reputed to be an "escape." The plant on Osey was growing near the limits of high-water, four or five feet high, with flexuous stems, and whether an escape or not, it is improbable that it has been introduced by other than natural means, as there is only one small homestead upon the island). It was stated that *Glaucium luteum* (yellow horned-poppy), *Cakile maritima* (sea-rocket), *Honkeneja peploides* (sea-pimpernel), *Trifolium maritimum* (sea-trefoil), etc., also occur. The following plants were noticed in addition to those mentioned:—

Fumaria officinalis.
Diplotaxis muralis.
Lepidium campestre.
Senebiera coronopus.
Arenaria serpyllifolia.
Spergularia rubra.
Reseda luteola.
Hypericum perforatum.
Sarothamnus scoparius.
Ulex europæus.
Vicia tetrasperma.
Sedum anglicum.
Conium maculatum (8 feet high).
Lactuca virosa (abundantly).
Crepis virens.
Artemisia maritima.
Filago germanica.
Anthemis arvensis.
Senecio jacobæa.
Cynoglossum officinale.
Veronica polita.
Glaux maritima.
Plantago coronopus.
Polygonum convolvulus.
P. fagopyrum.
Chenopodium rubrum.
Salicornia herbacea.
Beta maritima.
Obione portulacoides.
Mercurialis perennis.
Humulus lupulus (stems unusually prickly).

Allium oleraceum.
Juncus maritimus.
J. gerardi.
Zostera marina.
Z. angustifolia.
Scirpus maritimus.
Carex vulpina.
Spartina stricta.
Festuca sciuroides.
Triticum repens var. *littoreum*, *etc.*, *etc.*

Mr. E. M. Holmes gathered the following MOSSES on the island, but under conditions noted in the records for Hazeleigh, and very many more probably occur:—*Ceratodon purpureus*, L., *Physcomitrium pyriforme*, L., *Bryum capillare*, L., *Polytrichum juniperinum*, Willd., *Brachythecium albicans*, Neck., and *Eurhynchium prælongum*.

The LICHENS observed on Osey included *Cladonia furcata*, Hffm., *C. pyxidata*, Fr., *Peltigera canina*, L., *Physcia parietina*, L., *P. pulverulenta*, Schreb., *Lecanora ferruginea*, Huds., *L. aurantiaca*, Lightf., *L. subfusca*, Ach., *L. umbrina*, Mass., and *L. gibbosa*, Ach. (on pebbles.)

Two species of microscopical fungi, both apparently new to Britain, were found on the *Suæda fruticosa*, one belonging to the genus *Uromyces*—but precise details as to these must appear later on.

During the day Mr. Fitch partly read, and partly gave *viva voce*, an account of "The Blackwater Estuary," and Mr. T. V. Holmes, F.G.S., had prepared a paper on "The Geology of Maldon and the Blackwater Estuary"—both these essays will be printed in a future number of the ESSEX NATURALIST. Mr. Fitch pointed out the places of interest that could be dimly seen through the mist as the vessel glided down the estuary. NORTHEY ISLAND (concerning the geology and entomology of which notes have already appeared in the ESSEX NATURALIST) was pointed out, and also the site of the BOROUGH or BARROW HILLS, which will be described in Mr. Fitch's paper; STANSGATE ("Stone-gate," a stone-walk or passage to the water), including Ramsey Island, a hamlet of Steeple, originally *Uluuinescherche* (Uluuin was one of Edward the Confessor's theyns, and a man of large Essex possessions) was also indicated. The ruins of the Priory are in fair preservation, the building now being used as an agricultural barn. It was an off-shoot of the magnificent Abbey of Clugny, and was founded before 1176. Osey Island has been already mentioned, and distant views were also obtained of Mersea, Brightlingsea Town and Church, St. Osyth's Priory, etc., and the very interesting building known as BRADWELL CHAPEL, which serves to point out the site of a buried city, one of the nine Castra of the "Littus Saxonicum," catalogued in the "Notitia Imperii," which was drawn up about A.D. 403. Camden had thrown out the idea that OTHONA was the "Ithanceastre" of the Saxons, and the Effeceastre (properly Ethceastre) of Domesday, and had placed it at St. Peter's Head on the southern bank of the mouth of the estuary. Philemon Holland in his "Additions" to the "Britannia," confirms this, and tells us that here were the remains of a huge wall, near which many Roman coins had been found. Mr. Lewin describes the locality thus:—"St. Peter's Head is a tongue of land about half a mile broad from north to south, and originally, no doubt, projected to a considerable distance to the east; at the present day, at low water, a muddy bank runs out to the extent of about three miles, and for a mile and a half it is almost level. The changes and freaks of the sea in this part are remarkable. At present all is mud or ooze, which has observably increased within the last ten years, but within the memory of man there was no mud, but a clear sand along the water's edge; indeed, races were formerly witnessed on the sands, which have now totally disappeared." About 20 years since a company, called the "Essex

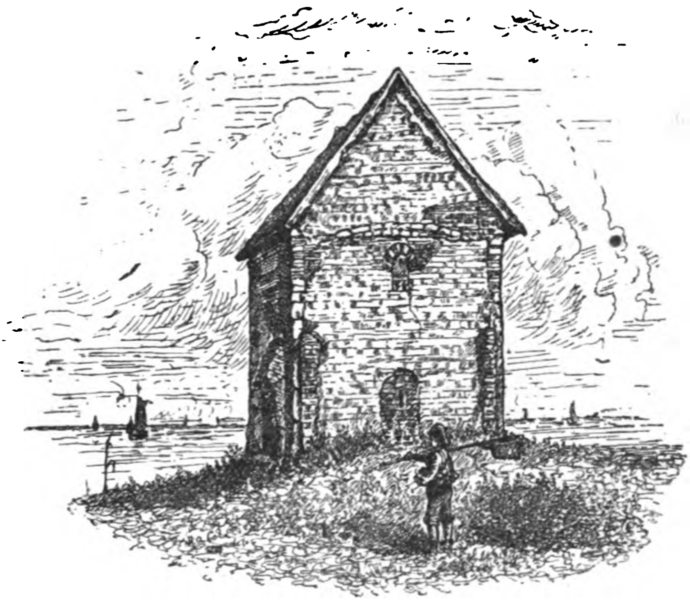
Estuary Company," was formed for enclosing some of the Essex saltings. In the course of their operations it became necessary to remove a quantity of soil at St. Peter's Head for the purpose of embanking, and they thus lighted upon the foundations of a solid wall of Roman masonry, which proved, on examination, to be the remains of the long-lost castrum of OTHONA, which, enclosing from seven to eight acres, was seated about the middle (from north to south) of this tongue of land, but on the east the sea has washed away the greater part of the walls. The property fortunately belonged to Mr. Oxley Parker, who had the remains thoroughly explored, with the assistance of Mr. Roach Smith, Mr. Thomas Lewin, Mr. Chancellor, etc., and the relics discovered were those exhibited at our meeting in Dr. Plume's library. Full details will be found in Mr. Lewin's paper in volume xli. of the "Archæologia," and in a paper by Mr. Roach Smith in the "Gentleman's Magazine" for 1865. Othona was probably built by Carausius (A.D. 286-293), who rebelled against the Roman authority and declared himself Emperor in Britain, but was soon (A.D. 293) slain by Allectus, who was in turn slain in A.D. 296 by Constantius Chlorus, when he reclaimed Britain again to the Roman Empire after ten years of independence. Coins of twenty-four Emperors—from Gallienus to Honorius—were found (exhibited at the meeting), but those of Carausius occurred in the greatest abundance. The west wall extends 522 feet, and the Porta Prætoria (principal entrance) was on this side; the fosse is still traceable on the north, west, and south sides—the water still stands in the S.W. corner. The masonry was about twelve feet thick, but no part of the walls now rise above the surface of the ground. This Castrum, built to oppose the piratical invasions of the Saxons, was occupied by a band of the Fortenses for about 120 years, as it was, of course, evacuated when the Romans abandoned Britain (A.D. 409) in the reign of Honorius.

As to ST. PETER'S CHAPEL, there can be little doubt but that it is the veritable handiwork of the old Saxon missionary, Bishop Cedd (St. Chad). Bede tells us that the two most famous churches built by Cedd (who converted the East Saxons to Christianity in the reign of Sigebert, A.D. 653) were at Ithanceastre and Tilbury, so probably the chapel was his cathedral; at any rate it is particularly interesting as the earliest attempt at an ecclesiastical edifice in the county of Essex, at the dawn of Christianity in Britain, when the majority of the population was still pagan, and when all England lay in comparative darkness. This Saxon chapel (appropriately dedicated to St. Peter, the Apostle of the Gentiles) is built in the very jaws of the Castrum—in the Porta Prætoria, the western gateway. The greater part of it lies within the Castrum, but a portion projects beyond. Not unlikely the foundations of the Roman pharos were enlarged to serve for the apse of the Saxon church. Morant tells us that in 1442 a jury found this chapel "had a chancel, nave, and small tower, with two bells; that it was burnt, etc." Later (Elizabeth-Charles II.) it was used as a beacon or lighthouse, and it is still a well-known sea-mark. The spot where once so many thousands congregated—Britons, Romans, and Saxons—is now a waste without a dwelling in sight, and the only building is the barn into which a part of the old chapel of Bishop Cedd has been perverted. Two water-colour drawings by the Rev. H. M. Milligan were exhibited, from one of which Mr. H. A. Cole has made the accompanying sketch, and also a plan of Othona, prepared by Mr. Chancellor.

Mr. Fitch read Col. Lumsden's spirited paraphrase of the Saxon "Song of Maldon" ("Macmillan's Magazine," March, 1887), a contemporary historical fragment (than which nothing is finer in Saxon literature) celebrating, in poetical and Cædmonian diction, the prowess of Byrhtnoth the Ealdorman, and other

Anglo-Saxons, in battle with the Danes, "arrayed by Panta's stream." Mr. Fitch read this heroic fragment with an evident pleasure, which communicated itself to his hearers.[14] Mr. Andrew Johnston inquired afterwards whether there were any descendants of the Danes (who had now very light blue eyes) in the neighbourhood. Mr. Fitch said the old Norsemen were many of them supposed to have dark eyes and red hair, and the general opinion seemed to be that distinctions of race had been lost.

The tide was now full, but there was not a breath of wind, and the broad waters of the estuary were smooth as glass. The company went down to dinner in two parties, and spent a long time over the repast, which was highly creditable to the "King's Head" caterer. Some surprise was excited on their return on deck to find that so little progress had been made towards home. The barge was slowly tacking across the river—sometimes nearer to Bradwell chapel, again nearer the square tower of East Mersea church, but as these two points were approximately opposite, never a yard nearer Maldon. For a long time, however, no alarm was felt. Seawards, the town of Brightlingsea was dimly visible, and, as in the land of the Lotus Eaters, "all round the coast the languid air did swoon." At length, the voyagers began to ask when they were going to lose



St. Peter's Chapel, Bradwell-on-Sea. *Drawn by* H. A. Cole *from a Water-colour Sketch by the* Rev. H. M. Milligan.

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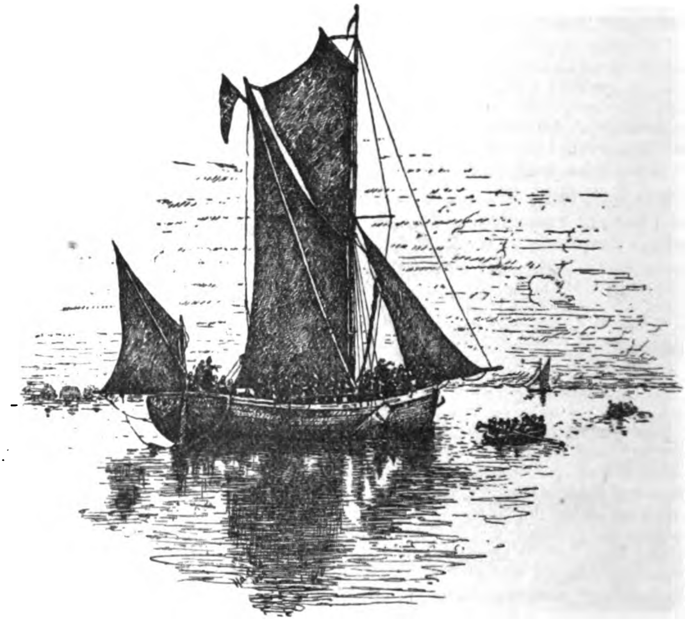
[14] The Cottonian MS., containing this valuable fragment, perished in the fire at Dean's-yard, Westminster, Oct. 23rd, 1731. We owe the preservation of the poem to Thomas Hearne, who printed it at the end of his edition of the "Chronicle of John of Glastonbury" (1726). For the Saxon text, see Benjamin Thorpe's "Analecta Anglo-Saxonica," 1834 ed., pp. 121—130; 1846 ed., pp. 131—141.

sight of that everlasting church on one side and the chapel on the other. The skipper, when appealed to upon the subject, provokingly declared that it all depended on the wind—if a breeze sprang up, the barge would get home, if not, well, there were plenty of provisions on board, and the company must sleep as best they could! At five o'clock, when Maldon was still sixteen miles away, the President summoned a mass meeting, and by a show of hands ascertained that eighteen visitors at least must get home, including one or two clergymen, whose flocks would otherwise be left without a shepherd on the morrow. Under these circumstances—the special train leaving Maldon at a quarter to nine—it was decided to take the urgent cases up in two small boats. The Mayor and Town Clerk seized the oars in one, Mr. R. H. Eve and Mr. R. W. Christy in the other, and with a parting cheer the boats went off, and were soon lost in the mist. The more energetic members of the main party worked hard at the long "sweeps," without which help the "Rose" would hardly have reached Maldon that night, while others extemporized a concert to while away the tedium of the adventure. As the barge slowly drifted into Maldon, nearly fourteen hours after the start, the Mayor and his Town Clerk (Mr. J. C. Freeman) came on board amid great cheering, the small boats having been rowed up to the town in time for the passengers to catch the special train, an athletic feat of which the oarsmen might well be proud. On the motion of Mr. Shenstone, seconded by Mr. Crouch, a vote of thanks was passed to the Mayor, with musical honours; nor was compliment ever better deserved.



Becalmed on the Blackwater, September 15th, 1888. *From a drawing by* H. A. Cole.

Mr. Fitch had worked with untiring zeal and energy for the instruction and entertainment of the meeting, and the inveterate punster of the party hit the general feeling in declaring that everything had been "*couleur de* '*Rose*,' with the exception of the *wind* which never '*rose!*'"

[At Maldon the Chelmsford contingent hired a drag to get home that night, but the main body of members went home on Sunday morning, and others on the Monday. Reports of the meeting were given in most of the county papers, but we may specially mention the excellent accounts of each day's proceedings which appeared *on the following mornings* in the "East Anglian Daily Times." The report of Friday's proceedings, extending to 300 lines, was read on the water on Saturday. We have to thank Mr. E. M. Holmes, Mr. Shenstone, Mr. Crouch, Mr. T. V. Holmes and, of course, Mr. Fitch, for lists and other information.—ED.]

Colias edusa.—I am no entomologist, but seeing in the ESSEX NATURALIST (*ante*, page 170) a statement respecting the rarity of *Colias edusa* of late years, it may interest some of our readers to know that during the partridge shooting in September, I commonly see two or three examples every season, and this year I should say that the number seen exceeded twenty.—DARELL STEPHENS, F.L.S., F.G.S., Trewornan Wadebridge, Cornwall, Nov. 12th, 1888.

Catocala Nupta with Black Underwings.—On September 30th of this year (which, it will be remembered, was a very cold day), I was coming out of a cottage near Butler's Bridge, West Bergholt, when I noticed at rest on the wall a specimen of *C. nupta*, and wishing to see it spread its beautiful red under-wings, I touched it with my finger. To my surprise, instead of rushing off, as this insect usually does on being disturbed, the specimen simply raised the front wings (the cold weather apparently having made it very sluggish), and exhibited to my astonished eyes a pair of *black* under-wings. Of course I transferred it to my hat ("chimney-pots" are very useful at times) as quickly as possible, and took it to my friend Mr. Harwood, with a request that he would set it for me. The variation is that instead of the splendid *red* under-wings, the whole surface of these wings is suffused with black, but the black borders, etc., are still visible. The upper wings appear to be normal, but the insect is somewhat under the usual size of the species.—HENRY LAVER, M.R.C.S., F L.S., Colchester, November, 1888. [By the kindness of Dr. Laver we have been enabled to show this interesting specimen to many experienced entomologists, but no one appears to have seen or heard of such a remarkable aberration in this moth. We should hardly describe the upper wings as being quite "normal"—the ground colour of the wings is much whiter than usual, the markings somewhat darker and more distinct, and there is an entire absence of the yellowish-brown scales.—ED.]

Atomaria linearis, Steph., Destructive to Mangold.—Upon my return from the Colchester Meeting of the Club on May 22nd, the news greeted me that all my young mangold plants on Northey Island had disappeared! The eight acres of mangold in question had been sown on May 1st, and when I had last seen them about a week previously, the three thin green rows of young plants on each stetch were visible from one end of the field to the other. Now there was scarcely a healthy plant to be seen, and upon examination it was evident that the mischief had been done to the stalk, which was completely barked, and blackened in most instances, the cotyledons being entire, although withered and dead. I looked for wireworms, in vain; but at each plant were a few minute brown beetles, somewhat resembling in miniature an *Elater*, which speedily moved off into hiding from the hot sunshine as the earth was disturbed around the plants. The little beetles were just below the surface of the ground, from two to twelve specimens being found around each freshly eaten plant. They were somewhat active in their movements, but I collected about a hundred specimens, and upon examination at home, made them out to be *Atomaria linearis*, Steph., the specimens varying in colour from pale brown to almost black. This beetle has already been recorded by M. Bazin as destructive to mangold on his estate, just south of Paris (see Ann. Soc. Ent. France, for 1846 and 1847), and Curtis ("Farm Insects," p. 396), says "this beetle is abundant in England, and no doubt affects the crops of mangel-wurzel in this country." I have most certainly proved the truth of this surmise. I again drilled the field alluded to with mangold and swede seed together on May 23rd, harrowing it all over twice. Six stetches on which were a few old plants were left untouched, but the plants disappeared in a day or two. As the new plants came up they were again attacked, and at the time of writing (July), the swedes are certainly four times as numerous as the mangolds, although my men had orders to leave a mangold plant wherever possible when singling the plants. The species of the genus *Atomaria*—of which thirty-one are known as British—are so small and difficult to determine, that I sent living specimens to Mr. Charles O. Waterhouse, of the British Museum, who confirmed my determination, and wrote:—"The little beetles *are Atomaria linearis*. It is a common species, but I was not aware that it was ever so abundant as to do serious mischief." The larva of only one species of *Atomaria* (*nigripennis*, Payk.) has been described, and but little is known of the life-histories of any of the Cryptophagidæ; as far as the small imagos are concerned, which occur in numbers in all sorts of vegetable refuse, it seems difficult to suggest a remedy that would be directly applicable.—EDWARD A. FITCH, F.L.S., Maldon.

Large Lobster at Burnham.—On Friday [Nov. 16th] a very fine lobster, weighing 7 lbs., was caught in a trawl by C. Witton.—"Essex Weekly News," November 23rd, 1888.

The Toper Shark (*Galeus vulgaris*) at Clacton.—In the "Essex County Chronicle" it is mentioned that a shark, five feet long, had been captured on November 1st, off the pier at Clacton-on-Sea. Notice of the occurrence was sent to me by the captor, Mr. Legerton, and on my going to Clacton to examine the specimen, I found that the shark was the same species as that I lately recorded in the ESSEX NATURALIST (vol. ii., 137), viz., *Galeus vulgaris*, the "Toper." It is far from common on our Essex coasts, but I have notes of three other specimens captured within the last four years.—HENRY LAVER, F.L.S., Colchester, November 18th, 1888.

Reported Nesting of the Black-Redstart in Essex.—With reference to the record by Mr. W. R. Ogilvie Grant ("Zoologist," October, 1888, p. 390, and ESSEX NATURALIST, ii., p. 192) of this species having bred early in May last, "in a hole, in an ivy-covered oak tree" growing in Danbury Park—having, through the kindness of Mr. Ogilvie Grant himself, had an opportunity of inspecting the nest and eggs at the Natural History Museum, I should like to say that, in my opinion, the eggs and nest are undoubtedly those of a *Robin*. The white variety of the eggs of this bird may almost be called common, and I have repeatedly either taken or heard of such in this district. The nest is composed externally of dead hazel and oak leaves, the interior being constructed of bents, fine roots, and skeletonized leaves, lined with fine grass and a very little hair. I consider it a typical robin's nest in all respects, except that it contains no moss. The two eggs which have been preserved differ much in size. The larger and normal one measures ·8 by ·6 of an inch, almost exactly, these being the average dimensions of robins' eggs. The other egg is very much smaller, and is evidently an abnormal egg, such as might be expected from a weak or injured robin laying colourless unspotted eggs. I have not yet seen the site of the nest, but I feel confident that the nest is that of a robin, and that the "dark-coloured bird with a red tail," which Mr. Ogilvie Grant's informant thought she saw leave the nest, was a redstart, with a nest somewhere in the immediate vicinity. The breeding of the Black Redstart in England has been several times recorded on very doubtful grounds, but never yet satisfactorily established.—MILLER CHRISTY, Chignal St. James, Chelmsford, December, 1888.

THE ESSEX FIELD CLUB.

THE NINTH ANNUAL CRYPTOGAMIC AND BOTANICAL MEETING.

Saturday, October 27th, 1888.

THIS assembly, which has been held every year since the establishment of the Club, came off under very pleasant meteorological conditions, October 27th being one of those spring-like days for which the autumn of 1888 has been memorable. A departure from the usual programme had been projected, so that other parts of Essex, as explored by the mycological botanist, could be requisitioned to furnish forth the tables of named specimens in the meeting-room. But unavoidable circumstances connected with Dr. Cooke's and the Secretary's engagements had made it imperative to pospone the foray to a date when shortened days would render it unwise to initiate any departure from the usual programme, and consequently it had been thought best to defer any visit to "fresh woods and pastures new," in search of fungi, until another season. This necessity was the more regretted, inasmuch as the early autumn had been very favourable for the growth of fungi, whereas, later on, the night frosts were detrimental to many delicate species.

The Hackney Microscopical Society held their annual hunt in the forest on September 8th, exploring Hawk Wood, Bury Wood, Woodman's Glade, High Beach, etc., under Dr. Cooke's and Mr. Massee's guidance, and more than 130 species of the larger fungi were gathered, including the following new to the forest list:—

Russula granulosa, Cooke. ("Grevillea," xvii., 40.)
R. fallax.
R. armeniaca.—Fairmead.
Cortinarius rigidus.
Hygrophorus calyptræformis.
Cortinarius caninus.
Cantharellus infundibuliformis.
Agaricus (*Pleteus*) *nanus.*
Lactarius aurantiacus, Fl. Dan. t. 1909.—New to Britain. On the ground, Fairmead. ("Grevillea," xvii., 39.)
Russula maculata, Quel. New to Britain. ("Grevillea," xvii., 40.)
Agaricus (*Naucoria*) *subglobosus*, Alb. and Schw. Syll. 3406. New to Britain. On the ground, Woodman's Glade. ("Grevillea," xvii., 38.)
Hypoxylon cohærens.
Sphærotheca pannosa.
Scolecotrichum uniseptatum, B. and C. New to Britain. On dead wood. ("Grevillea," xvii., 41.)
Comatricha typhina.
C. friesiana.
Physarum cinereum.
Fuligo varians.
Isaria farinosa.
Licea applanata.

The exertions of the members of our own Club on October 27th were less successful, owing partly to the lateness of the meeting, and partly, no doubt, to the extreme dryness of the soil about High Beach, which was the principal scene of operations. Some night frosts which prevailed previous to the meeting also did much damage. Dr. Cooke and Mr. George Massee again most kindly acted as "conductors" and "referees," arriving with a small party at Chingford about 10 o'clock, and were driven by the Secretary to High Beach. Other parties arrived at Loughton during the day, where they were also met by the Secretary, and directed to the rendezvous. One large party went on to Theydon Bois, and walked back through the woods to Buckhurst Hill, collecting on the way. Early in the afternoon, Dr. Cooke and Mr. Massee established themselves in the meeting-room at the "Roebuck" Hotel, Buckhurst Hill, and entered upon the task of naming and arranging the specimens as the bands of collectors came in. A very interesting series was collected, about a hundred species, from various parts of High Beach, Loughton, Lord's Bushes, Buckhurst Hill, Woodford, etc. Among them Dr. Cooke and Mr. Massee were able to identify the following as new to the Epping Forest list:—

Agaricus (*Mycena*) *parabolicus*.
A. (*Stropharia*) *thraustus*.
Phlebia merismoides.
Clavaria grisea.
Grandinia granulosa.
Periza badia.
P. succosa.
Polyporus applanatus.
P. radiatus.

Thus the additions to the forest flora as the result of the two "forays" in 1888 comprised twenty-nine species, of which five were new to Britain.

The large room at the "Roebuck" was, as usual, arranged for the display of botanical specimens, and the following collections were shown:—Mr. J. T. Powell exhibited a collection of the Rubi of Epping Forest, consisting of about twenty authentic forms, together with several others as yet undetermined. This collection was the result of two seasons' work at this difficult genus within the forest area.[1] Mr. Carlton Rea exhibited a large number of coloured drawings of Fungi, collected in Worcestershire this season. Mr. W. White, a set of plates of varieties, of British Ferns, from Druery's "Choice British Ferns." Mr. E. Step, a series of photographs and drawings of Fungi, made by himself. Mrs. Trench, a set of drawings of fungi in oil colour, made from specimens collected near Shoeburyness, Essex. Microscopical specimens were exhibited by Mr. Wire, Mr. Crouch, and other members. A great number of large wall-diagrams of lower forms of plant-life were shown by Mr. David Houston, and a series of diagrams of natural history were lent by Mr. Wheldon, of Queen Street.

At five o'clock the usual Club Tea was served, after which an ORDINARY MEETING (the 94th) was held in the Meeting Room, Prof. G. S. Boulger, Vice-President, in the Chair.

The following were elected Members of the Club:—Messrs. J. Baker, G. E. Crick, Arthur Downes, M.D., R. H. Eve, A. M. Gillham, S. W. Squier, J.P., and Rev. E. R. Horwood, M.A.

Prof. Boulger alluded to the regretted absence, owing in some cases to illness, of botanists who were commonly present at this annual gathering, and said that he was sure all would miss Mr. English, who for many years had been a prominent figure at the fungus forays, and whose death in the early part of the year was a great loss to the Club.

Dr. Cooke made a few remarks upon the results of the day's hunting, and then read a paper he had prepared—"Notes on the Larger Fungi of Epping Forest," which summed up the result of the preceding eight "Fungus Forays" on the orest, and which will be published in the ESSEX NATURALIST as an introduction to a revised list of the Hymenomycetes of the district, so as to form a starting point for further researches on the Mycological Flora of Essex.

Prof. Boulger, in thanking Dr. Cooke for his admirable summary of the results of former years' work, hoped that in future it would be possible to extend their researches into other parts of Essex—they not only wished to ascertain the whole number of species growing in the country, but also their distribution in different parts of it. Most of the gatherings had been made in woods, but it should be remembered that many fungi were meadow-loving, and districts near the coast had been much neglected.

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[1] A preliminary list of the brambles already determined will shortly appear in the ESSEX NATURALIST, and Mr. Powell hopes, after another summer's work, to compile a tolerably complete list of the Forest Rubi, with localities.

The vote of thanks was seconded by Prof. Meldola; and Dr. Cooke, in reply, pointed out the vast field (at present almost unexplored) presented by the various forms of microscopic fungi—and the great interest and pleasure members would derive from the collection and study of these exquisitely formed plants. He suggested that he should come down to one of the meetings of the Club, and give a sort of preliminary lesson in the subject, so that members disposed to take up the subject might be set to work. We boasted of our 300 species of the larger fungi in the forest, but he was sure that in a short time the members might easily gather a thousand species of the smaller forms. They could be collected almost everywhere, and at all seasons of the year. And one great merit they possessed was, that their preservation, in many cases, was the simplest task possible. Those in search of a pleasant botanical recreation, and employment for their microscopes, would do well to turn their attention to the collecting and study of these minute but beautiful plants.

Mr. George Massee, F.R.M.S., etc., then delivered an address, of which the following is an abstract :—

UNSOLVED PROBLEMS IN PLANT-LIFE: being suggestions on some leading botanical investigations that have been attempted, but require to be further extended and verified.

[*Abstract.*]

Strasburger's Experiments on Foreign Pollination.—Professor Strasburger, of Bonn, while carrying out some investigations on the Fertilization of Phanerogams, frequently noticed *foreign* pollen-grains on the stigmas of plants, which in numerous instances not only put out pollen-tubes, but also frequently penetrated for a greater or less distance down the styles. Being struck with such an unexpected phenomenon, the Professor instituted numerous experiments in this connection,[2] and showed that not only would pollen-grains germinate on the stigmas of plants, having not the remotest affinity, but further, that there appears to be no mechanical provision for the prevention of foreign pollen falling on and germinating on the stigmas. Numerous illustrations are given; the following selection will indicate the line of research :—Pollen of *Fritillaria persica* sent out pollen-tubes when placed on the stigmas of *Convallaria latifolia*, *Scilla non-scripta*, *Orchis morio*, and other species. Pollen of *Orchis morio* also germinated readily on the stigma of *Fritillaria persica*, pointing to a condition of reciprocity, which, however, in numerous other experiments did not prove to be constant. The pollen of *Agapanthus umbellatus*, a monocotyledon, germinated readily on the stigmas of many dicotyledons, as *Achimenes grandiflora* and *Nicotiana tabacum* ; the pollen of the latter germinated readily on the stigma of *Agapanthus*, but that of *Achimenes* did not. The above experiments point to the conclusion—yet to be proved—that the comparative paucity of hybrids, except in certain groups, as willows, roses, brambles, and mints, is due to the specific specialization of protoplasm, *i.e.*, other things being equal—the protoplasm in the pollen-grains is more stimulated by contact with the stigma of the same species than by that of any other, and the question to determine is the cause of this difference of degree on the part of the style and stigma in favouring the formation of pollen-tubes. This can only be arrived at after a very extended series of experiments; it is important to ascertain to what extent the comparatively few experiments instituted by Strasburger hold good, as to how many different kinds of pollen will form tubes on foreign stigmas, also to what extent reciprocity holds good. Cut flowers can be used, and the anthers may be cut away so as not to interfere with the experiments, although this is not essential, as Strasburger has shown that both normal and foreign pollen often germinate side by side on the same stigma. It is advisable to use pollen for experimenting that possesses marked microscopic characters, so as to be able to trace its tubes readily when a section of the style is placed under the microscope. In this connection, experiments between wind-fertilized and insect-fertilized plants would suggest themselves as being eligible—the pollen, as a rule, being very dissimilar in the two groups. Finally, Strasburger has shown that the stigma is not absolutely necessary, the pollen germinating quite as readily on the cut surface of the style after the stigma had been removed, as on the stigma itself. Pollen-grains, as a rule, form their tubes within twenty-four hours after being placed on the stigma. To ascertain whether pollen-tubes have been emitted, it is necessary to make longitudinal sections of the stigma and style. With a dilute watery solution of magenta, the pollen-tubes stain deeply, the tissue of the style being only faintly tinged.

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[2] Pringsheim's Jahrbücher, Band. xvii, Heft. 1.

Views as to the Origin of Multicellular Plants.—In some of the lower forms of life, the cells are naked—not furnished with a cell-wall—as in the fungi known as the Myxogastres during the vegetative period. In others again, as *Pleurococcus vulgaris* (the green matter on trunks, stones, and almost everything that has been exposed for any length of time to the atmosphere), the protoplasm or vital part of the single cell which constitutes the plant, is enclosed in a protective skin, or cell-wall, of cellulose, secreted by the protoplasm. This cell-wall has usually been considered as the outermost coating of the cell, but it has recently been shown[3] that there is present in many species of algæ, both fresh-water and marine, a thin layer external to the true cell-wall, agreeing in many respects, chemically and physically, with protoplasm. This layer is generally more or less viscid, especially when the cells are young, and it has been suggested that it has to do in some way with the evolution of multicellular from unicellular plants. This change is effected by degrees. It is known that many normally unicellular fresh-water algæ form "colonies"—the unicellular organisms retaining their individuality so far as nutrition and reproduction are concerned, but adhere in colonies, being bound together by a matrix of viscid matter outside their cell-walls. There are various advantages connected with this colony-forming idea, one being that of greater power of resisting desiccation—possibly the greatest of the many difficulties encountered by the pioneers of plants in attempting to emerge from their primitive aquatic mode of life, and take possession by degrees of dry land—and it is perhaps not too much to say that the idea of colony-formation on the part of lowly plants has resulted in the immense variety of vegetable life which to-day clothes the earth. In many of the simpler algæ, which may be considered the starting point of plant life, the usual mode of reproduction is by fission, or a gradual contraction of the parent cell into two parts, each destined under favourable conditions to repeat the same process, and after the external secretion phase had been perfected, the unicellular or multicellular nature of the plant depended to a very great extent on the behaviour of the viscid secretion. If the inherited tendency of the protoplasm to round itself off after division predominated, the two portions became free and unicellular; but if the viscid secretion became rigid at an early stage and overcame the tendency to round off, then a multicellular plant resulted. By degrees, as plants became multicellular, the individuality of the component cells was lost; differentiation took place, resulting in such highly complex and specialized structures as epidermis, scent glands, pollen-grains, etc. To corroborate or refute the above idea, towards which present research seems to point as an important factor in the evolution of the vegetable kingdom, it is necessary that the fresh-water algæ, which abound everywhere, and can be kept alive for a long time in aquaria or even bottles, should be subjected to a rigorous examination. Among the points to be determined are—(*a*) the presence or absence of the external sheath or viscid layer; (*b*) its exact composition; (*c*) the effect of varied conditions as to temperature, quality of water, and light, on the production and behaviour of the sheath. Such observations, however apparently without result, could not but tend to elucidate eventually the origin of multicellular plants.

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[3] Berthold; Unters. Bot. Inst. Tubingen, ii. (1886), Massee; Journ. Bot., Sept., 1887.

Parasitism and Mutualism: their respective influences.—The novel discovery recently made by Kamiénski[4] and Frank[5] that the plants belonging to the order Cupuliferæ, which includes the hazel, hornbean, beech, oak, etc., obtain that portion of their food derived from the soil through the intervention of fungus mycelium or "spawn" which forms a felt round the young rootlets, will, if corroborated, illustrate in a remarkable manner the correlation between two distinct species (and in the present instance species widely separated in the scale of plant life) for mutual advantage. Three points necessary for the further study of this idea are required—(*a*) to ascertain what species of fungus the mycelium belongs to; being deep underground the mycelium remains barren, but if placed nearer the surface it might produce fruit; (*b*) whether the mycelium is invariably present and on how many species of plants; (*c*) whether the species of oak, hornbeam, etc., can be raised by water-culture, or other methods, independent of the fungus.

In conclusion, Mr. Massee pointed out that workers with the microscope might do good service in trying to confirm or extend the observations to which he had referred—the subjects were of great interest, and deserve the attentive study of all interested in botanical science.[6]

Prof. Boulger proposed a vote of thanks to Mr. Massee for his very intertesting and suggestive address, which was seconded by Mr. White, and carried by acclamation. Mr. Massee, in his reply, again strongly urged the members to take up some such studies as those he had referred to. The observations required were not difficult to make; students should at first repeat the observations of others, and then endeavour to strike out new lines for themselves.

Some time was then spent in examining the various objects on the tables, and the meeting broke up about nine o'clock.

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[4] Mem. Soc. Nat. Sci. Cherbourg, xxiv. (1884).

[5] Ber. Deutsch. Bot. Gessell (1885).

[6] The papers referred to by Mr. Massee, as well as others treating of confirmatory or extended investigations in the directions indicated, will be found abstracted in the "Summary of Current Researches" contained in the "Journal of the Royal Microscopical Society" for 1885—1887. —ED.

ORDINARY MEETING, Saturday, November 24th, 1888.

THE Ninety-fifth Ordinary Meeting of the Club took place at the Public Hall, Loughton, at seven o'clock, Mr. E. A. Fitch, President, in the chair.

The following were elected members of the Club:—Messrs. J. Dixon; W. T. Goold; J. Lowry; Carleton Rea, M.A., B.C.L.; R. South, F.E.S.; J. S. Stacy; G. H. Verrall, F.E.S.; J. H. Walker; and Miss E. M. Lovell.

In accordance with the rules, Mr. Walter Crouch was nominated Auditor of the Treasurer's accounts, on behalf of the Council, and Mr. C. Ridley on behalf of the members.

The Librarian read out a long list of books added to the Library since the last ordinary meeting, by gift, purchase, or exchange, and especially called attention to the first volume of the "Report of Excavations at Cranbourne Chase," by General Pitt-Rivers, F.R.S., one of the honorary members of the Club, which sumptuous work had been presented by the author.

The President said that he was sure the members would feel grateful to Mr. Wire for the activity shown in his office, as evidenced by the additions made to their store of books.

Mr. W. White, in presenting some early volumes of Mr. Symons' "British Rainfall" to the Library, said he was pleased to read in them that of the two earliest rainfall observers, Mr. Townley and Dr. Derham, one was an inhabitant of Essex. In 1698 Dr. Derham had found the rainfall at Upminster to be 20 inches, which, if corrected for the height of his gauge above ground, came out as 23 inches, and was within an inch of the results of modern observations; thus, to use Mr. Symons' words, "the records of the 17th and 19th centuries were in perfect accordance," showing the accuracy of observation possessed by our Essex worthy nearly two hundred years ago.

On the agenda-paper of the meeting, Mr. W. Cole had proposed to call the attention of the Club to the great injury that would be done to Epping Forest if the piece of land (now up for sale) lying off the Theydon Road, known as "Oak Hill Enclosure," were built upon. In the "Journal of Proceedings" for 1882 (vol. 3, p. xi.) Mr. Cole had before pointed out the great importance of this piece of land to the well-being and quietude of the woodlands surrounding it. Mr. Cole, however, informed the meeting that for some reasons which had come to his knowledge since the issuing of the agenda notices, he thought it well not to bring the matter forward publicly at that moment. Many people interested in the welfare of the Forest were fully alive to the importance of the matter, which would certainly not be overlooked when the time for action came.

Mr. W. Cole exhibited a Palæolithic implement which he had picked out of some gravel from the "St. Swithin's Farm" gravel pits at Barking Side, Essex, when visiting the locality in company with Mr. Walter Crouch. The deposit was river-gravel, of the Roding Valley, and for permission to examine it carefully he was indebted to the kindness of the owner, Mr. Llewellyn Hatton, but no further finds had been made. The implement had been thus described by Mr. Worthington Smith:—"Palæolithic implement of flint from Barking Side; pointed, sub-triangular, with straight sides, and heavy butt; sub ochreous, slightly abraded and lustrous; somewhat large patch of original sub-ochreous crust at extreme base; length 4½ inches, width 3 inches, weight 12 oz." Mr. Smith wrote that his nearest locality to Barking Side was at Wanstead, where he had found numerous Palæolithic implements; also at Leytonstone, Leyton, etc., and that he had found two Palæoliths at the place marked "Wallend" on the inch Ordnance Map, one mile west of Barking Town.

Mr. W. White exhibited various insects that had been taken on the occasion of some of the summer excursions of the Club. One, a somewhat uncommon insect, belonging to the Neuroptera - Planipennes, *Osmylus chrysops*, L. (*O. maculatus*, *St.*), was caught near Sawbridgeworth, while on board the barge on the river Stort, during the meeting on July 18th. Another, a local moth (*Myelois cribrum*), which is restricted in its distribution chiefly to the Essex coast, was taken in the pupal stage on the "Saltings" at Brightlingsea, May 20th last. The larvæ pupate in the stems of the thistle, and Mr. White had remarked that most of the thistle plants in that locality were packed with the chrysalids as closely as well could be. On the same occasion he and several other members took some larvæ of the "Essex Emerald Moth" (*Phorodesma smaragdaria*), as already recorded in the ESSEX NATURALIST (*ante* p. 116), and in exhibiting two preserved specimens of this curious larva, Mr. White wished to add that he had not wasted these rarities, as perhaps might be inferred from the Editor's note in the report of the Colchester meeting; but he had been able to correct some slight errors that had been made in some previous descriptions of the caterpillar. Of the eight or ten larvæ captured, he had four, two of which he had carefully preserved, while the other two died. Having exhibited these insects at the Entomological Society in June, Mr. White read some extracts from the published report of that meeting (Proc. Ent. Soc., 1888, pp. 20 and 21). The larva, he said, had been described as living in a case formed from its food plant (*Artemisia maritima*), whereas its habit is to only partially cover itself with those particles of its food which it had bitten off the plant during its feeding, and these particles were caused to adhere to the surface of the insect by means of a sticky exudation, as noticed by Mr. George Elisha (Trans. Entom. Soc. Lond., 1886, p. 466), but a remarkable thing about this habit is that it is attained by a highly specialized means. Actual *excretory glands* had become developed for this purpose, disposed irregularly upon various segments of the body; they are seen, with the aid of a strong lens, to be prominent elongate processes of a whitish colour, each bearing at their top a single, stiff, rather long hair, which, doubtless, serves to spike the fleshy substance of the *Artemisia*. Sketches were shown in illustration of this point. Mr. White thought there could be no doubt—although he found no result could be produced artificially by applying gentle pressure externally to the glands—that they really possess the functional value claimed for them, as evidenced by the fine dust particles and larger fragments of leaf which were seen to be still firmly attached to the insects notwithstanding the rolling to which the skin had been subjected in the preserving process. There are not any particular "humps" upon certain segments, as had been stated in some descriptions, unless the glandular protuberances just described are intended, and this is impossible; but the skin in the sub-spiracular region is much wrinkled, forming an irregular and somewhat flattened fringe upon the sides of the anterior segments, adding greatly to the general protective resemblance to its food plant, which is so strong a feature of the insect.

Mr. Oldham exhibited some Lepidoptera taken this season in Epping Forest. Among them was *Scotosia rhamnata*, and a very remarkable aberration of *Argynnis euphrosyne*, taken near Theydon Bois, on June 4th. In this specimen (a ♂) many of the usual black spots on the upper side of the fore-wings are absent, and the double marginal row of black spots is indistinct, the spots running together; the upper sides of the hind-wings are suffused with black, in which the row of fulvous lunate spots (somewhat enlarged) appear very distinctly. On the under side of the fore-wings the markings are almost obliterated, while the central yellowish band on the under side of the hind-wings has spread over almost the whole surface, and there is a sub-marginal band of reddish-brown. The usual silver spots on the margin are elongated in shape. Mr. Oldham's attention was called to the butterfly amongst numbers of its fellows, by its dark appearance when on the wing.

Mr. E. A. Fitch exhibited a fossil crab (*Xanthopsis leachii*, Desm.), of which our specimens had been found in the London Clay at Maldon, during the progress of the railway works there; also a tooth of a shark (*Otodus obliquus*, Agass.) from the same. Although an immense quantity of London Clay had been excavated, only about half-a-dozen fossils had been found. Mr. Fitch thought it remarkable that so few fossils were found in the London Clay at Maldon, while at Sheppey the same formation was very fossiliferous.

Mr. T. V. Holmes thought the apparent paucity of London Clay fossils at Maldon might be explained by the fact that they were very difficult to detect in freshly-excavated clay; at Sheppey they were often washed out of the sections of the clay, and were therefore much more easily seen.

Mr. Walter Crouch exhibited a measured drawing of a female specimen of the Whale, Rudolphi's Rorqual (*Balænoptera borealis*), which was captured in the River Medway, on the 30th of August last, by some Gillingham fishermen. The position of the animal on its right side, under a small landing stage, enabled Mr. Crouch to obtain a good view of the exterior form, and make a drawing; which was quite impossible in the cases of the specimens stranded in the Crouch River, and at Tilbury. The whale measured 32 feet 2 inches in length, and was very plump. The dorsal fin was small, ending almost in a point, and deeply emarginated. The baleen was short, as usual in females, the longest blades (of which he exhibited two) measuring only 12½ inch in length. Mr. Crouch humorously remarked that this whale had evidently intended to claim an obituary notice as an Essex Whale in the Journal of the Essex Field Club, but was misguided at the Nore, and took the wrong turning.[1]

Mr. Crouch also mentioned that the skeleton of a specimen of this whale—a male, 36 feet long—which was taken at Orkney, in December, 1884, is now in the possession of Prof. Struthers, of Aberdeen. Referring to the male of this species stranded at Tilbury, in October, 1887 (*vide* ESSEX NATURALIST, ii. pp. 41-46), Mr. Crouch showed some photographs of the baleen, and mentioned that the skeleton had been purchased by the Trustees of the Natural History Museum at South Kensington.

Mr. Miller Christy sent for exhibition, by the President, two photographs, accompanied by the following remarks:—

PHOTOGRAPHING LARGE WILD GAME.

I send herewith a couple of photographs which I hope will be thought of some interest. As photographs merely, they cannot be said to be very successful. Their chief interest lies in the fact that they are some of the results of what is, I believe, the first attempt ever made to photograph large game in a perfectly wild state. They will, on close examination, be found to contain recognizable portraits, though certainly very faint, and not easily made out, of some of the wild Mountain Bison which still survive in the Yellowstone National Park, where they are now protected by law. The Mountain Bison is a race or variety of the ordinary Buffalo of the plains, now so nearly exterminated. It has always been a rare animal, found only among the dense forests and rocky defiles of the Rocky Mountains. A lengthy account, by me, of "The Last of the Buffaloes," may be found in the "Field," of November 10th.

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[1] A full record, with measurements, by Mr. Crouch, of this specimen appears in the October number of "The Rochester Naturalist." The paper is abstracted in the "Zoologist" for December (vol. xii., 3rd series, p. 466), but the visit of the stranger is there erroneously credited to the Essex Coast.—ED.

Mr. E. Hofer, who resides in the Park, and is a good amateur photographer, recently gave ('Forest and Stream," May 31st, 1888) a most interesting account of an attempt to carry out this curious and novel idea—that of photographing large game in a wild state. The difficulty of doing this, which may be easily imagined, is graphically described by Mr. Hofer. It will readily be seen that the difficulties connected with stalking and shooting a large wild animal are very small when compared with the stalking and *photographing* of the creature. In the latter case, the light must be exactly right; the game must be found more or less in the open; the distance must be small; and a good deal of manipulation of the camera has to be gone through before a "shot" can be taken—conditions to which the rifleman need pay little or no heed. After several more or less successful attempts to photograph elk, deer, and antelope, Mr. Hofer started out with snowshoes on May 13th, with the object of making an attempt on the wild buffalo. In about a week he returned with a number of fair views, though in some of them the animals are rather indistinct, in consequence of their having been taken among large timber. On one of the plates, ten head of buffaloe can be made out. Altogether Mr. Hofer found and photographed fifty-two animals. These results were not obtained without much patience and perseverance on the part of the photographer, who, however, showed the most lively interest in the success of his expedition. "I find [he says] that one can get more excited over taking a picture of an elk or buffalo than he would be if killing was the object." In conclusion, Mr. Hofer states his belief that, during the last four or five years, the buffalo in the Park have increased in numbers on account of the protection they have received. Over 100, he says, must have wintered on Alum Creek, where most of his views were taken. He adds that, "It would be a very hard task to find all the buffalo in the Park, but it could be done in winter, and would show a total of over 200." A fine of $50 and six months imprisonment is the penalty for killing a buffalo in the Park.

The photographs herewith exhibited are two of those taken by Mr. Hofer on the occasion described. They give a very good idea of the forest scenery among the higher parts of the Rocky Mountains in the Territories of Wyoming and Idaho, which I had the pleasure of visiting a year or two since. On one of them two head of buffalo may be made out, and on another one may be seen. All are partly concealed among the trees. Those who require fuller information may obtain it direct from "Forest and Stream."

Mr. Greatheed alluded to the many difficulties to be overcome in making such photographs, and said that in 1886 Mr. J. Fortuné Nott brought out a volume entitled "Wild Animals Photographed and Described," but inasmuch as all the photographs were made in the Zoological Gardens, the critics fell foul of the title of the book as a misnomer.

Prof. R. Meldola, F.R.S., read a paper entitled "The late Col. Russell's Contributions to Photography." This paper will be printed in a future number of the ESSEX NATURALIST.

The President, in proposing a hearty vote of thanks to Prof. Meldola for his interesting paper, said that he knew the late Col. Russell very well as a sportsman and naturalist, and now they learnt that he had many claims to be remembered as an original investigator in a most valuable branch of applied science. He might add that Col. Russell had a comprehensive and minute knowledge of the topography and natural productions of the Essex coast, and it was greatly to be regretted that so much of his rich stores of information had died with him.

Mr. Champion Russell, in seconding, thanked Prof. Meldola for the clearness with which he had explained the chief points of Col. Russell's photographic work, and for his kind allusions thereto. He had brought up for exhibition a few specimens of his father's early photographs, but unfortunately he was unable to add much to the particulars already before the meeting. At the time that his father was engaged in these investigations he (the speaker) was quite a small boy. His father never did much camera work; the photographs he made were intended more for the purpose of demonstrating the capabilities of his discoveries as practical processes, than as specimens of artistic merit; he often said that photography would be delightful were it not for its pictures! His father gained two medals for his discoveries in photography—a gold one at the Paris Exhibition, and a bronze one at Dublin; but so much jealousy and bad feeling appears to have been shown with respect to these discoveries, that his father resolved, should he obtain further results, to refrain from publishing them, and hence his photographic ardour cooled, and he turned his attention to other subjects.

Mr. C. Ridley alluded to the immense utility of photography in modern scientific investigations—for instance, in solar and stellar observations. The latter often required hours and hours of exposure of the plate in the camera before the faint images of distant stars could be caught. Such exposures would have been utterly out of the question with the old processes, and hence he thought they ought to be proud of Col. Russell's discoveries, as most important contributions of an "Essex Worthy" towards the scientific work of the world.

Prof. Meldola, in acknowledging the hearty vote of thanks, entered into details as to the employment of photography in physical and astronomical observations, and said that the beautiful processes of photography bid fair to be among the most delicate and useful weapons which modern science had placed in the hands of the investigator.

Prof. Meldola (as the Club's delegate at the Association) then gave a *vivâ voce* report of the Proceedings of the Conference of Delegates at the Bath Meeting of the British Association. He entered into details of the subjects brought before the Conference, as being suitable fields of work for local societies to undertake. and referred to some of the suggestions made as to how such work could be best carried out. These matters will probably form the subject of a separate article in the ESSEX NATURALIST.

A discussion on several points of detail was carried on by the President, Mr. White, Mr. C. Russell, Mr Greatheed, Mr. Holmes, and others, and a vote of thanks was passed to Prof. Meldola for his report and for his services as Delegate of the Club at the British Association.

It had been thought that the meeting would afford a good opportunity for an exhibition of photographs by various processes, taken by members and others; particularly of Essex scenery, buildings, etc. In response to the Secretary's invitation, the following were exhibited:—*Mr. Champion Russell*, specimens of the late Col. Russell's early photographs, showing the first results of his dry-plate processes. *Mr. E. A. Fitch*, "Epping Forest and adjacent country illustrated," a volume containing 42 large photographs, with descriptive letter-press; also an album containing 52 photographic views of Maldon, and many illustrative of the recent floods in Essex, etc. *Mr. Greatheed*, a large number of views in Essex, taken by himself, including some taken at Field Meetings of the Club. *Mr. O. Osborne*, a collection of his own photographic work in Essex; views taken at Field Meetings, etc. *Mr. W. J. Argent*, views in Essex and Devonshire, by himself. *Mr. Gillham*, views, principally of Wanstead and its neighbourhood, by himself. *Mr. Percy Lindley*, a fine series of views of Epping Forest, taken by the London Stereoscopic Company. *Mr. Crouch*, photographs of baleen of whale; and sections of corals, etc., with photographs on opal glass of the Pink and White Terraces of Rotomahana, New Zealand, destroyed in June, 1886, as transparencies. *Mr. F. W. Elliott*, views of the Lake Districts; and, by the intervention of Mr. N. F. Robarts, Messrs. Mayall and Co. sent some very beautiful specimens of their new process for colouring photographs. In noticing the specimens exhibited, Mr. Gillham, Mr. Wire, Mr. Fitch, and others, hoped that attention would be given to the proposal that the Club should collect for preservation as complete a series of Essex photographs as possible—the work was one in which almost every member could afford aid. The usual conversazione brought the meeting to a close.

ORDINARY MEETING, Saturday, December 29th, 1888.

THE Ninety-sixth Ordinary Meeting was held in the Public Hall, Loughton, Mr. E. A. Fitch, President, in the chair.

The following were elected members of the Club:—Rev. J. W. Mills, M.A., Rev. L. Newcomen Prance, M.A., and Mr. G. E. Sibbald.

In accordance with Rules III. and IV., nominations of new members of Council and Officers for 1889 were made in view of the ninth annual meeting in January.

Prof. Meldola exhibited three moths—*Nemeophila russula*, *Agrotis strigula* (*porphyrea*) and *Noctua glareosa*—from Epping Forest; the former taken in 1888, and the two latter some years ago. He remarked that the two first were decidedly heath-loving species, and it was interesting to note their occurrence in the forest in connection with the view that parts of Epping Forest were formerly covered with heath. The existence of Camps on the forest appeared to favour this idea.

Mr. W. Crouch exhibited a female specimen of the "Emperor Moth" (*Saturnia carpini*) bred from a larva which he found feeding on heather, at an altitude of about 2,000 feet, nearly at the top of Shutlingslowe, Cheshire, one of the highest peaks of the Pennine chain; also a prepared specimen of the larva from another locality, and drawing of the hairy pink spots on the caterpillar taken from the Shutlingslowe example. The interest attaching to the specimen was the great altitude at which it was obtained. On the same occasion and at about the same height he gathered a small piece of the somewhat rare white heather (*Calluna vulgaris*, var. *alba*).

Prof. Meldola remarked that he thought *Saturnia carpini* had been recorded from equal or higher altitudes in some parts of Europe. Mr. Fitch said that he found the larva commonly at Maldon, where it feed principally on bramble, and Mr. W. Cole said that it was sometimes found in the forests districts.

Mr. Crouch referred to the beautiful woodcut of the Goshawk in the December part of Mr. Howard Saunder's "Illustrated Manual of British Birds." The drawing was taken from Mr. Mann's goshawk "Shadow of Death," mentioned in the report of the Bishop's Stortford meeting (*ante* page 208). Also to a paper by our member the Rev. E. S. Dewick, F.G,S., in the "Archæological Journal" (vol. xlv.) on the discovery of the remains of an "Ankerhold" (recluse cell) on the north side of the chancel of St. Martin's Church, Chipping Ongar.

Mr. W. Cole exhibited several species of Lepidoptera taken during his recent visit to Maldon. Their party (including Mr. Fitch, Messrs. B. G. and H. A. Cole, Mr. H. C. Snell, and himself) had three nights "sugaring" in Mr. Fitch's delightful wood at Hazeleigh, but moths were very scarce. They, however, found *Asphalia* (*Cymatophora*) *diluta* in abundance at the sugared trees—this moth is not recorded in the Rev. G. H. Raynor's paper on "The Macro-Lepidoptera of the District around Maldon" in the "Trans. Essex Field Club," vol. iii., pp. 30-47. They likewise took *Anchocelis litura* in Hazeleigh Wood, previously recorded by Mr. Raynor only from Danbury and Woodham Mortimer. He also exhibited the specimen of *Acherontia atropos* taken by Mr. Furbank on the occasion of the Club's excursion on the Blackwater (*ante* page 188).

Mr. Walter Crouch, F.Z.S., then read a paper "On the Land and Fresh-water Mollusca collected in Wanstead and the Neighbouring Districts (Becontree Hundred)," in which he recorded seventy species, prefacing his remarks by a brief notice of the papers and lists which had already been published in connection with Essex forms. By a few sketches on the blackboard, he showed the chief features of the various forms of mollusca, and how the differences in these produced a modification in the structure and shape of the shell, which thus becomes an important part of the animal, being the outward expression of the internal and vital parts. He also referred to the formation and coloration of these shells by glands and pigment cells—to the horny jaw and the wonderful structure of the lingual membrane or "odontophore" in the Gastropoda, studded with thousands of minute siliceous incurved teeth of varying shapes and in symmetrical rows, numbering in *Limax maximus*, one of our common slugs, as many as 28,960,

A complete series of the shells was exhibited by Mr. Crouch, the smaller species being accompanied by his enlarged drawings from the living forms, and minute shells and teeth, etc., were shown under microscopes brought by Mr. Gillham and the author.

The President thanked Mr. Crouch for his interesting paper which, when published in full in the ESSEX NATURALIST, would be one of permanent value. He alluded to the papers on the Mollusca of Essex previously published by the Club (Dr. Laver's paper on the Mollusca of Colchester, Trans. ii, 88; Mr. Harting's on the Methods of Collecting, E.N. i, 169, and Mr. French's paper on the Mollusca of Felstead, E.N. ii, 1), and said he thought that when lists from various localities had been collated, Essex would be found to possess a very large proportion of the known British species of Land and Fresh-water Mollusca.

A discussion was carried on by the President, Mr. Elliott, Mr. Wire, Mr. Greatheed, Mr. W. Cole, and the author. Mr. Wire gave some recollections of the late Mr. J. Brown, of Stanway, who had forty or fifty years ago investigated the fossil deposits of shells at Copford and other places in Essex. Mr. Wire, when a boy, knew him personally, and used to collect for him. His collections went to the British Museum, and his books to Prof. Owen. Mr. Wire hoped before long to present to the Club a short memoir of Mr. Brown.

Mr. Greatheed called attention to the enormous marine shell-bank near Burnham, of very considersble length, and now a mile or two inshore, owing, doubtless, partly to natural and partly to artificial causes. The President hoped that the Club would be able to visit this shell-bank, which was well worthy of attention, being 6 or 7 miles long, extending from opposite Foulness Island to Bradwell; so far as he knew the shells of which it was composed were cockles. But Mr. Greatheed said that he had found other shells in the bank.

Mr. Crouch read the following:—

NOTE ON SAKE'S (COMMONLY CALLED "SNAKE'S") LANE, WOODFORD.

[*Abstract.*]

The lane leading from Woodford Green to Woodford Bridge, which is now usually called Snake's Lane, has been of late years generally associated with that animal; by some people on account of its winding character and length, whilst others assert that the reptile itself formerly abounded in that locality. Of the late we have no evidence; and both these reasons are, I believe, mere invention.

Warner, in his "Plantæ Woodfordienses" (1771), mentions in several places "Sake's, commonly called 'Snake's' Lane," showing thereby his doubts as to the popular name, but I can show better and far older evidence, going back over 300 years to the days of "Good Queen Bess."

The old Deed, which I exhibit, I found after my father's death in 1879, among a mass of family records. It is dated 1583 (25th of Elizabeth), and is an indenture between John Crowche and Margaret Whethill, for the sale of various lands and houses abutting on Sake's Lane, Woodford. The area was about 30 acres, and it was sold for £270, equal to several thousand pounds of our money.

In this indenture Sake's Lane is mentioned several times, with no variation in the spelling, and it therefore seems evident that no doubt existed at that date as to the real name of the lane.

Many and great alterations have doubtless occurred since that period, and so far as I can gather, the lane did not originally extend down to Woodford Bridge, but probably ended at the entrance to the grounds of Ray House, with perhaps a bridle-way or footpath through. The lane had been completed, however, before the large "Actual Survey, 1772-74," by Chapman and André, published in 1777, and had *then* an angular turn to the right about half-way down (due, if my hypothesis be correct, to the closing of the right of way), subsequently skirting Ray Park down to the bridge; where in olden days the Wood-ford probably existed. My object in this note is to call attention to this ancient name, in the hope of eliciting further evidence. Some may have access to older documents or records, and be more fortunate than I have been in the endeavour to trace the origin of the name. I might suggest that the name was possibly that of some earlier owner or occupier of the adjacent land—a custom which obtained to so large an extent in early times.

The Deed contains many local names of persons and places, all of which seem to have disappeared except those of "Mounckam Grove" and "Sake's Lane." The following names of places occur:—"Riptons" or "Ryptons," "Hobbes," "Yendes Lane, *alias* H . . . . Lane" (*quære* Horne), "Maggotte, *alias* Motes," "Le Redens," and "Little Boyes."

Mr. N. F. Robarts had had an opportunity of going through the Woodford Vestry books, commencing in 1679, and found that the first mention of the lane was "Snake's Lane" in 1738, when Messrs. Hannot and Hollingsworth gave a road to the parish which passed through their grounds from Snake's Lane to Woodford Bridge. This was probably the present lower part of Snake's Lane, running from the old lodge at the entrance to Monkham, which stood where Station Terrace now stands. He thought it probable that "Ribton Lane" ran from the Wood-ford, between Harts and "Muncombes," into Sake's Lane to the same spot, as Warner speaks of the hedge dividing his garden from Ribton Lane, and also of plants found between Ribton Lane and Woodford Bridge. Mr. Robarts also called attention to the floods in 1770 and 1888, which greatly damaged the lower part of Snake's Lane, and to the fact that another road in Woodford, Salway Hill, was called after a resident, Mr. Salwey, who lived there in the last century. In this case also the spelling had changed.

The President thought that the tracing of old roads, bye-ways, and lanes, with their names, and the derivation of the same, was extremely useful, and came to a certain extent within the province of the Club. He might say that "Maggottes" occurs as a name of farms in several places in Dengie Hundred; he thought it had some topographical significance, and was not connected with any personal cognomen. Some of these old-place names had received attention in the "East Anglian";

e.g., "Hog Lane," which occurs not uncommonly in the Eastern counties. Then there are the numerous "Gallows Fields" (which are nearly always copyhold in tenure), and the "Hangman Woods," "Hangman's Acres," etc.—the derivation of which present difficulties, but which he thought was a subject worthy of study by their antiquarian members.[1]

A paper "On the reported Breeding of the Scops Owl (*Scops giu*) in Essex," by Mr. Miller Christy, was read by the Secretary. The paper will appear in a future number of the ESSEX NATURALIST.

The President remarked that if the breeding of the Scops owl in Essex could be proved, it would be an important fact, inasmuch as Mr. Howard Saunders, his recently issued "Manual of British Birds," was of opinion that the only authenticated instance of the bird's breeding in England was in Norfolk in November 1861.

Votes of thanks to the authors of the papers were passed, and the meeting concluded with the usual service of light refreshment.

Grey Phalarope in Essex.—"On November 21st a Grey Phalarope (*Phalaropus fulicarius*, L.) was brought to me for preservation. It was killed with a stone from a catapult on Wanstead Flats.—J. G., Forest Gate," in "Field," December 1st, 1888.

Hopes of the Great Black Woodpecker (*Picus martius*).—Mr. C. J. Strong, of Peterborough, the owner of a British-killed great white heron, writes:—"A scarcer bird still was to my *certain conviction*, and not only mine but that also of my sister, killed on a tree just outside my garden when I was a boy—the great black woodpecker. To my deep regret I have been unable to substantiate this fact, as my father refused to purchase the bird (this we both vividly remember) of the gardener who shot it, and it disappeared. This man is, or was lately, still alive, but failed to remember the fact when I was trying to make a good case out for Mr. Gould's work. I have, however, personally no doubt whatever of the occurrence of the bird here."—Communicated by Mr. J. H. GURNEY (jun.), F.L.S., of Keswick Hall, Norwich.

Late Staying of Martins and Swallows.—On the 20th of November I saw a number of birds flying over some "saltings" near this town, which I believe were sand-martins, but I could not get near enough to be sure of the species. On mentioning the matter yesterday to Mr. S. Ratcliffe, of Woodham Walter, he told me that he had watched two martins flying about the house for fully an hour on the 22nd inst.—ROBERT H. EVE, Fullbridge, Maldon, November 24th, 1888. [In the "Field" for December 1st, Lieut.-Col. Marsden records the fact that an old swallow with full-forked tail was merrily hawking about in the sunshine on November 26th, over a pond at Great Oakley, Essex.—ED.]

Otter at Stisted.—On the 6th of January, a vixen otter, weighing 15 lbs., and measuring 3 feet 6 inches in length, was shot on the Stisted Hall estate by Mr. Baine, bailiff to Mr. Savill-Onley Onley.—"Essex Weekly News," January 20th, 1888.

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[1] There is a "Hangboy Slade" in Epping Forest, and we have been told that the part of the forest on the Woodford and Buckhurst Hill Road, after the old Turnpike house, and near where "Knighton" now stands, was formerly known as "Hangman's Wood." Mr. Robarts points out that Warner ("Plantæ" p. 96) gives as a locality "opposite Hagger Lane near the Gibbets," and suggests that "Hagger" is a corruption of "Hanger," and he adds—"there was formerly a Hanger Lane at Stamford Hill, on the highway to Tottenham, the famous dangerous place for highwaymen—possibly a "hanging" place, "pour encourager les autres."

Until a year or two back a "Pig Lane" existed at Buckhurst Hill, but the name has been stupidly changed to "Beech Lane." Dedham also boasts of a "Pig Lane," and there are, we believe, others in Essex. In the "East Anglian" several plausible derivations of "Hog Lane" are suggested:—(1) a way by which hogs were driven into the forest to avoid a longer and more difficult path; (2) a lonely unfrequented way, inspiring fear (A. S. *Hogge*, care, fear); (3) a steep and hilly way (*Hogh*, a hill); (4) that it is a relic of old days when the manor was everything, when swineherds exercised their office, and hogs were fed and tended. In connection with these suggestions the name of "Hog Hill," in Hainault Forest, will be remembered.—ED.

Sand Grouse in Essex.—I can now give the following meagre records of this interesting bird visiting our county, additional to those mentioned in ESSEX NATURALIST, ii. pp. 61-66. Mr. A. F. Gates (Marsh Gate Lane, Stratford) writes in the "Zoologist" (1888, p. 264), that "A flock of about twenty was seen at Barking Side on June 4th, and two were subsequently shot, which proved to be adult males. I myself came across about a dozen of them in a ploughed field near Blake Hall Station on the Ongar line, Great Eastern Railway, on June 10th." The birds shot are those referred to by Mr. Crouch, and exhibited by him at the Upminster meeting. On the same page of the "Zoologist" we also read "My brother Mr. G. F. Mathew, R.N., informs me of a flock of five having been seen near Harwich towards the end of May—*Murray A. Mathew* (Buckland Dinham, Frome, Somerset)." Mr. Ernest Smith writes me from the Limes, Southminster, September 1st.: "The first time the birds were seen on Foulness Island was in the beginning of June. I saw them myself on Saturday, the 30th of that month, on a farm in our occupation called 'Shelford'; they were seven in number and I immediately recognised them by their resemblance when on the wing to golden plover. They rose within easy shot of me and only flew a short distance. I have seen them once since but cannot say whether they have now gone or are still in the neighbourhood, as a good deal of the corn is yet uncut." Mr. Fred Stallibrass, writing from Foulness, under date September 8th, says: "The sand grouse I believe, are still about in the Island" (a report confirmed later by Mr. E. Smith), "I first saw them, nine in number, this year either on the 28th May or 4th June on Great Shelford; on the 18th June I put one out of the ditch by New House Head." Mr. Stallibrass also adds the following hitherto unrecorded occurrence relating to 1863: "My late brother John W. Stallibrass shot a sand grouse on New Marsh Farm some time in June 1863; at that time there were seven, he did not shoot any more as he was in hopes they would stop and breed; that year they were not seen on the Island after the middle of July." The bird referred to was stuffed and is still in existence. When Mr. Walter Crouch and myself were at Colchester on November 7th, we saw two cock sand grouse recently stuffed by Mr. W. D. Cole; these were shot out of a flock of four by Col. Davis' keeper at Walton, on October 18th; the birds were in capital condition, and their crops were full of wheat, with a few small seeds.—EDWARD A. FITCH, Maldon, December, 1888.

Common Crane (*Grus communis*, Bech.) at Elmstead near Colchester.—On Friday, November 9th, some large birds were observed in a field on Elmstead Hall Farm. One of these was shot, and it is now in the hands of our local bird-stuffer. Mr. J. Pettitt, of Colchester. On examination it proved to be a specimen of the Common Crane in immature plumage, being without the red mark on the head, and with the wing feathers which cover the tail not fully developed. It makes, however, a very fine specimen, and it is of interest as probably the first specimen of the species recorded as having been captured in the county of Essex. It has been secured for the Saffron Walden Museum.—HENRY LAVER, F.L.S., Colchester, November, 1888.

Seals in the Blackwater.—Several seals have been seen in the Blackwater this summer. Yesterday, when down the river spruling, we saw one rise twice within 60 or 70 yards of our yacht, and the second time Mr. Fred Cocks, one of our party, had a good shot at it with a heavy charge from his eight-bore. The seal was evidently hit hard, and we at once rowed to the spot, just above Double South Beacon between Northey and Osey Islands, but failed to trace our interesting visitor. We had a watch set all day, but at present there are no tidings of a capture.—EDWARD A. FITCH, Maldon, October 16th, 1888.

Black Tern at "Warlies," Waltham Abbey.—You may like to note that on the 18th of July last we had Black Tern on my pond here. I watched one for some time, but two had been seen for two or three days previously. On turning to the plate in Gould's "British Birds," I believe that the bird I saw was a young one.—(Sir) T. FOWELL BUXTON, "Warlies," Waltham Abbey, November, 1888.

Food of the Otter.—Much ignorance appearing to prevail on this subject, as evidenced by the ruthless way in which otters are slaughtered in the supposed interests of fishery proprietors, it may be well to quote the following passages from some interesting articles on "Rapacious Animals in East Anglia" which have recently appeared in the "East Anglian Daily Times." The author thus writes of the otter:—"There is abundant proof that the diet of the otter is a mixed one, consisting of fish (especially eels, which are said to destroy vast quantities of the ova of other and more valuable fish), frogs, water-rats, and other small quadrupeds, aquatic birds, snails and other molluscs. According to the late Mr. E. R. Alston, F.Z.S., the stomach of one killed in June, examined by Macgillivray, was full of larvæ and earth worms. A correspondent of the 'Field,' alluding to otter hunting, says:—'When hunting a trail, it will be found constantly to diverge some distance from the river up a damp ditch or water-course, and the common remark may be heard, 'Ah, he has gone up there 'frogging.'' The same writer further on quotes the following remark of the Hon. Geoffrey Hill from the Badmington Library of Sports and Pastimes:—'Otters are not decreased in any way on my rivers; they are better preserved than they used to be, for people are beginning to find out that they kill and keep down the coarse fish and eels, which live on the spawn and fry of the better sort.' As to eels, they swarm in all our rivers, ditches and ponds to such an extent that, supposing the existing number of otters to be doubled, these animals could hardly, I think, make any perceptible reduction in their numbers. Again, Mr. T. E. Davies, in a communication to the same paper, says:—'A friend told me he had an otter which would follow him about the country, and that it would hunt all the wet places it came to for frogs which it greedily devoured; and a miller told me he had seen an otter hunting a field below the mill, as he thought, for frogs and snails.' Nor does this animal confine itself entirely to an animal diet, but is a partial vegetarian. Mr. W. Cartmel, secretary to the Kendal Otter Hounds ('Field,' Nov. 5th, 1887), says: 'Otters will eat celery, potatoes, young shoots from thorn hedges, and have a specially great liking for the first two.' That otters destroy a certain proportion of fish is, of course, indisputable, but the harm they do is unquestionably much less than is generally supposed, and certainly not sufficient to justify the treatment they too often meet with. The following is an extract from a note on this subject in the 'Field,' Feb. 5th, 1887: 'An experience of a quarter of a century on a trout and salmon river, where otters were numerous and fish always plentiful to anglers who knew how to catch them, has convinced me that the otter and the trout, and salmon too, can live side by side . . . . . Did those correspondents who advocate the unsportsmanlike practice which has caused this note (the trapping and shooting of otters) know the little river Bela, in Westmorland, a few yards wide only, which literally teems with trout, and in whose banks, for some six miles, two or three litters of otters are reared every year, they would say no more about the destruction wrought amongst fish by this most interesting amphibian.'"

Lathyrus tuberosus, L., and other Essex Plants.—In connection with the note in this volume of the ESSEX NATURALIST (*ante* page 170), respecting the occurrence of *L. tuberosus* in Sussex, it may be interesting to quote from Mr. Thomas Corder's original record of the plant in Essex, which will be found in the "Zoologist" for 1860, page 7165. Mr. Corder wrote:—"* * * * * The parish of Fyfield is several miles in extent, and the soil is a very strong heavy clay, with a sub-soil of calcareous marl. The plant in question is found abundantly in almost every cornfield and hedge-row in the parish, and also in the adjoining one of Willingale Spain, and probably in High Ongar. In some places it is so abundant as to damage the corn, and it has grown in the same fields for the last sixty years at least, according to the testimony of old men living at Fyfield, so that no doubt can exist as to its being a truly wild plant. I suggest that it may be called the 'Fyfield Pea.' Norton Mandeville, where *Bupleurum falcatum* was discovered by me many years since, is in close proximity to Fyfield, and I have since found that plant in a new locality, at Writtle, four miles from Chelmsford. I may mention that the very rare *Lathyrus hirsutus* is found at Nazing, Essex, in a field near the church, growing with *L. sylvestris*, *L. aphaca*, and *L. nissolia*, and also the scarcely less rare *Vicia bithynica*, all in the space of a few yards."

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(*Founded in* 1858, *to facilitate the Study of Geology and its allied Sciences.*)

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Or, NOTES AND QUERIES on subjects connected with the Counties of

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Edited by the Rev. C. H. EVELYN WHITE, F.S.A., F.R.Hist.S., Vicar of Christ Church, Chesham; Hon. Mem. (late Hon. Sec.) of the Suffolk Institute of Archæology and Natural History, etc.

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THE ESSEX FIELD CLUB.

NOTICES TO MEMBERS.

The second "Winter Meeting," including the usual monthly Ordinary Meeting (the 100th), will be held at Colchester on March 30th, 1889.

Due notices of this meeting will be sent to Members in the usual way.

The arrangements for Field Meetings during the ensuing summer are now under consideration. Any suggestions and offers of aid will be very gladly received by the Council.

New Members of the Club.—The subscription to the Club is 10s. 6d. per annum, with an entrance fee of 10s. 6d. Any information with respect to Membership, with copies of Rules, etc., will be gladly sent on application. The publications of the Club are forwarded post free, to members, and they can purchase all back issues at a reduction of 25 per cent. from the published prices.

Subscriptions.—Subscriptions (10s. 6d.) for 1889 are now due, and should be sent at present to Thomas Royle, Esq., "Dalton House," Upton Lane, Forest Gate, E. Post Office Orders should be made payable at Stratford, E., and Cheques crossed "London and County Bank," Stratford Branch. A large number of subscriptions for 1888, and previous years, are still unpaid, although individual notices have been *twice* sent by the Treasurer to members so in arrear. *It is particularly requested that all subscriptions overdue may be sent in at once.*

THE ESSEX NATURALIST.

The present parts complete Volume II.; the Title-page and Index will be sent out with the next part. The Editor very deeply regrets the delay that has taken place in the publication; the exceptionally heavy work in connection with the reports of the meetings and revision of papers has been the main cause.

After most careful consideration, and *very reluctantly*, the Secretary has recommended to the Council that a *quarterly issue* of the Naturalist should be adopted, at any rate for a time. The work thrown upon the Secretary in connection with the various meetings, reports of the same, preparing matter for the press, editing, and the increasing general business of the Club, etc., has latterly become too onerous to allow of a monthly issue being carried out with any regularity. The quarterly publication, although inconvenient in some respects, will diminish the labour and cost of production, and will permit of the matter being more varied.

The first quarterly part will be issued in March, and on the wrapper the Editor will give some details and suggestions for those willing to help in collecting information for the pages of the Naturalist.

Meanwhile the Editor will gladly receive "notes" or other communications for the forthcoming part.

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